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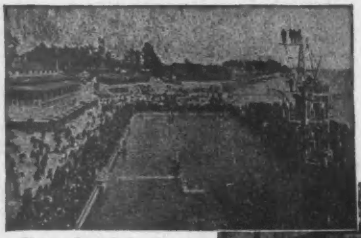

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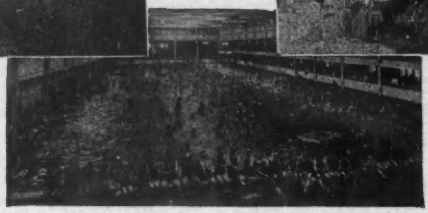

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CANADIAN PUBLIC HEALTH JOURNAL

VOL. XX July, 1929 No. 7

The Incidence of Bovine Tuberculosis in Children*

R. M. PRICE, M.B.

(*From the Laboratories of Pathology and Bacteriology, University of Toronto.*)

THE idea that tuberculosis in man can, in part, be traced to infection from cattle, had its origin early in the 19th century. Specific attempt at proof was first made in 1846, by Klenke, who was very emphatic in his belief that milk from tuberculous cows was infectious for children, and that scrofuloderma was a result of such infection. Villemin, in 1865, definitely proved the infectious nature of tuberculous material from man and animals by transmitting the disease to laboratory animals. With the discovery of the tubercle bacillus by Robert Koch in 1882, the similarity of tuberculous processes in man and animals was apparently settled.

The first step toward separation of varieties among tubercle bacilli was made by two Italian observers, Rivolta and Mafucci, who in 1892 published their observations on the avian strain of tubercle bacilli, and pointed out that this variety differed in many ways from the mammalian strain.

Theobald Smith, in 1896, further demonstrated that the mammalian tubercle bacillus probably comprised two distinct types, the human and bovine. He published further evidence of the existence of the bovine tubercle bacillus in 1898.

In the face of growing evidence of morphological and cultural differences of these two types of tubercle bacilli, little doubt was entertained as to the infectiousness of the bovine strain for man. While much work was being done on the relationship of milk from tuberculous cows to the presence of tuberculosis in man, the cases of accidental infection with the bovine virus during post-mortem work, and

*This research was carried on under a grant from the National Research Council of Canada.

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under other conditions, were considered final evidence of the susceptibility of man for the bovine tubercle bacillus.

Interest in the question of the susceptibility of man to the bovine tubercle bacillus suddenly became acute in 1901, when, at the International Congress on Tuberculosis held in London, Koch announced his belief that, though the human and bovine varieties of tubercle bacilli differed, he did not believe the bovine virus was an important factor in human infection. His views met with violent opposition from most quarters, and precipitated an enormous amount of research work. Numerous investigations followed as to the identity or non-identity of the bacillus from man and cattle, and at the same time viruses from man were investigated as to whether or not they were identical with those from cattle. Various commissions were appointed to study the question, and of these, the most outstanding were the British Royal Commission, the German Imperial Commission, and the work of Park and Krumwiede in the United States. A great deal of work was done, and the resulting evidence left no doubt of the infectiousness of the bovine virus for man, though it was noted by all workers that the incidence of bovine infection varies in different countries, and that the highest incidence of bovine infection occurs in children.

It is now generally agreed that tuberculosis in cattle is caused by the bovine type of tubercle bacillus only. The incidence of bovine infection in man, therefore, depends upon the amount of tuberculosis in cattle from which the milk is obtained, and the amount of raw milk consumed by children.

The incidence of tuberculosis in cattle varies in different countries. From figures available, it appears that in some countries in Europe, as high as 50 per cent of cattle are infected. In the United States the incidence of tuberculosis in cattle is given roughly as 20 per cent. In Canada, about 5 per cent of cattle tested react to tuberculin.

The milk supply, such as is furnished in most communities in the civilized world, yields tubercle bacilli in from 6 per cent to 20 per cent of all samples examined. Park, of the New York State Board of Health, in a paper published in May, 1927, gives the incidence of tubercle bacilli in raw market milk sold in New York City as 20 per cent.

Human pulmonary tuberculosis in nearly 100 per cent of cases in adults and 99 per cent of cases in children, is caused by the organism of the human type, whereas primary intestinal tuberculosis in children is usually due to infection with the bovine type. For other forms of clinical tuberculosis, one can simply state that the younger the individual the greater is the probability of the infection through the milk consumed, and the more likely is the case to be due to the bovine type.

Park and Krumwiede of the New York State Board of Health, in a series of 1,042 unselected cases of both medical and surgical tuberculosis

investigated, dividing the cases into three age groups, found the incidence of bovine infection as follows:

(*a*) Children under 5 years of age, 220 cases with 59 bovine strains isolated, or 26.8 per cent.

(b) Children from 5 to 16 years of age, 132 cases with 33 bovine strains recovered, or 25 per cent.

(*c*) Adults, 16 years and over, 689 cases, with 9 bovine strains recovered, or 1.31 per cent.

A study of 2,516 cases of various forms of tuberculosis reported in the literature up to 1914 compiled by Wang, of the University of Edinburgh, gives perhaps the most comprehensive idea of the amount of bovine tuberculosis in man existing in Western Europe, the British Isles and the United States. He found that, dividing the cases into three age groups, the incidence of bovine infection is as follows:

(*a*) Children under 5 years of age, 614 cases, with 199 bovine strains isolated, or 32.4 per cent.

(*b*) Children from 5 to 16 years of age, 591 cases with 171 bovine strains isolated, or 28.9 per cent.

(*c*) Adults, 16 years and over, 1,311 cases with 38 bovine strains isolated, or 2.9 per cent.

During the years of the war, 1914 to 1918, but few bacteriological examinations were made for the types of tubercle bacillus in human cases. Since then the majority of reports have come from Great Britain, and these show that the percentage of bovine infection remains high.

Up to the present, so far as we know, no studies have been made in Canada indicating the incidence of bovine infection in children, nor have we accurate figures indicating the frequency with which tubercle bacilli appear in raw market milk.

For the past three years, under the auspices of the National Research Council of Canada, we have been carrying out a study upon the incidence of bovine infection in children in one of the districts of Canada. The district with which we have dealt is the Toronto area, where city regulations demand a thorough pasteurization of milk, but to which, however, there is a migration of sick individuals from outlying districts seeking treatment in the various hospitals. By co-operation with these hospitals, and in particular with the Hospital for Sick Children, we have been able to study a considerable series of tuberculous children, from whom we have obtained material for the purpose of determining the type of infection.

Besides this, we have also had the opportunity of obtaining contact with a number of tuberculous children living in the towns and villages of Ontario.

Up to the present, we have recovered a total of 190 strains of tubercle bacilli from 168 children studied, all under 14 years of age. All these strains have been identified by laboratory means as to type.

Both medical and surgical cases were studied, and the group is comprised of the following types of cases:

Tuberculosis of bones and joints.
Renal tuberculosis.
Tuberculous adenitis.
Tuberculosis of the tonsil.
Tuberculosis of the adenoid.
Tuberculous meningitis.
Pulmonary tuberculosis (laryngeal swabs).
Pleurisy with effusion.

Of the 190 strains identified, 160 recovered from 148 children proved to be of the human variety, and 30 strains recovered from 20 different children were of bovine origin.

The 160 strains of tubercle bacilli of the human type were recovered from medical and surgical cases of tuberculosis. We made no particular attempt to isolate organisms from cases of frank pulmonary tuberculosis. We have, however, studied a number of laryngeal swabs obtained from children suffering from generalized tuberculosis. A number of positive swabs were obtained in this manner.

In the great majority of this group of cases studied, a history of contact to open tuberculosis was obtained. A number of our cases of surgical tuberculosis studied showed varying degrees of pulmonary or tracheo-bronchial tuberculosis, demonstrable on physical examination or X-ray. All these children reacted to tuberculin.

SUMMARY OF A STUDY UPON THE INCIDENCE OF BOVINE INFECTION IN CHILDREN

	Number	*Human Type*	*Bovine Type*
Bone and Joint Tuberculosis	65	63	2
Tuberculous Meningitis	32	31	1
Renal Tuberculosis	26	25	1
Pulmonary Tuberculosis (Laryngeal Swabs)	16	15	1
Tuberculosis of Lymph Nodes (Cervical and Mesenteric)	16	4	12
Tuberculosis of Tonsils	7	5	2
Tuberculosis of Adenoid (Pharyngeal Tonsil)	4	3	1
Tuberculous Pleurisy	2	2	0

Analysis of Bovine Strains

Up to the present, we have recovered 30 strains of tubercle bacilli of bovine origin, obtained from 20 different patients, as follows:—

Tuberculous Meningitis 1
Three strains recovered (*a*) *Cerebro-spinal fluid.*
(*b*) *Meninges.*
(*c*) *Mesenteric glands.*
Generalized Tuberculosis, including pulmonary tuberculosis, infant 15 months of age 1
Two strains recovered (*a*) *Sputum.*
(*b*) *Mesenteric glands.*
Tuberculosis of Knee Joint 1

Renal Tuberculosis 1
Three strains recovered (*a*) *Urine right kidney.*
(*b*) *Urine left kidney.*
(*c*) *Urine bladder.*
Tuberculous Mastoiditis 1
Two strains recovered (*a*) *Mastoid process.*
(*b*) *Cervical lymph glands.*
Tuberculous Cervical Adenitis 12
Sixteen strains recovered.
Tuberculous Tonsilitis 2
Tuberculosis of Adenoid 1

Summary of Histories Available

Case No. 1. K.D., age 2 years. Clinical diagnosis—Tuberculous Meningitis. Admitted to the Hospital for Sick Children from Kitchener, Ont. At autopsy, an extensive mesenteric tuberculosis was found. There was no evidence of pulmonary disease. Cultures recovered from the cerebro-spinal fluid, meninges and mesenteric glands, all yielded tubercle bacilli of the bovine variety. This boy had practically all his life been fed on raw cow's milk.

Case No. 2. M.S., age 15 months, of foreign parentage. Died of a generalized tuberculosis, including pulmonary tuberculosis. Cultures obtained from the sputum by means of a laryngeal swab, and mesenteric glands obtained at autopsy, both yielded organisms of the bovine variety. As far as could be ascertained, this infant was artificially fed, but no definite history concerning the source of milk could be obtained.

Case No. 3. E.P., age 8 years. Admitted to the Hospital for Sick Children from Point-au-Baril, with a clinical diagnosis of Tuberculosis of the Right Knee Joint. As far as could be ascertained, there was no contact to open tuberculosis. This boy had always been fed on raw milk of the district. The strain recovered from the pus aspirated from the knee joint yielded tubercle bacilli of typical bovine variety.

Case No. 4. A.B., age 12 years. Admitted to the Hospital for Sick Children with a clinical diagnosis of Bilateral Renal Tuberculosis and Tuberculous Cystitis. There was no history of contact to open tuberculosis nor is there any evidence of tuberculous lesions in other organs than the kidneys and bladder. Cultures isolated from the urine from both ureters and bladder yielded tubercle bacilli of bovine origin. This child was born in England and came to Canada five years ago. During her residence in England she was fed on raw milk.

Case No. 5. J.D., age 11 years. Admitted to the Hospital for Sick Children from Scarboro (a suburb of Toronto) with a clinical diagnosis of Tuberculous Cervical Adenitis and Mastoiditis. Two strains recovered from this patient, one from the lymph nodes and the other from the mastoid process, both yielded tubercle bacilli of the bovine variety.

This case is of particular interest, inasmuch as he is one of a group of cases under treatment in the surgical clinic of the Hospital for Sick Children from that neighbourhood. These children, suffering from various forms of surgical tuberculosis, chiefly tuberculous cervical

adenitis, came from the same neighbourhood, almost the same street, supplied by one dairy distributing unpasteurized milk. A sample of milk submitted for examination yielded tubercle bacilli of bovine origin, both in smear and on guinea-pig inoculation.

Case No. 6. R.S., age 7 years. Admitted to the Hospital for Sick Children from Lakeview Beach, Ont., with a clinical diagnosis of Tuberculous Cervical Adenitis. There was no history of contact to tuberculosis. There was no evidence of tuberculosis elsewhere. This boy had all his life been fed on raw cow's milk. The tubercle bacilli recovered were of typical bovine variety.

Case No. 7. F.M., age 8 years. Admitted to the Hospital for Sick Children with a clinical diagnosis of Tuberculous Cervical Adenitis. This lad was born in Scotland, and came to Canada one year prior to admission to the hospital. He, however, had had enlarged glands for two and one-half years. From the history of this boy, it appears that he had, more or less, all his life been fed on raw milk, or milk which had been heated but not boiled. Unfortunately, the glands removed at operation were lost. A tonsillectomy was done at the same time and one of the tonsils, both on section and guinea-pig inoculation proved tuberculous. A typical bovine strain of tubercle bacilli was recovered from this source.

Case No. 8. E.S., age 7 years. Admitted to the Hospital for Sick Children from Exeter, Ont., with a clinical diagnosis of Tuberculous Cervical Adenitis. There was no history of contact to pulmonary tuberculosis. This child had always been fed on raw milk from the town dairy.

Case No. 9. J.W., age 5 months, was admitted to the Hospital for Sick Children from Maple, Ont., with a clinical diagnosis of Tuberculous Cervical Adenitis. There was no history of contact to pulmonary tuberculosis, and no evidence of tuberculosis elsewhere. This infant had all his life been fed on raw milk from a mixed herd. The father, who owns the herd, admitted that one animal in the herd had a chronic cough, and showed progressive loss of weight. This animal, it would appear, had tuberculosis of the udder as well, but it was slaughtered before it could be examined. The organism recovered from the glands removed at operation was of typical bovine variety.

Case No. 10. A.McA., age 18 months. Admitted to the Private Patients' Pavilion, Toronto General Hospital, from Georgetown, Ont., with a clinical diagnosis of Bilateral Tuberculous Cervical Adenitis. This child, for nine months prior to admission to the hospital, had been fed on raw milk from a mixed herd. Pus aspirated from the glands, and the glands removed at operation, yielded tubercle bacilli of bovine origin.

Case No. 11. S.K., age 18 months. Admitted to the Hospital for Sick Children, from Markham, Ont., with a clinical diagnosis of Tuberculous Peritonitis. This child was breast fed for twelve months, and for six months prior to admission to the hospital had been fed on raw milk from a mixed herd. Repeated aspirations of the peritoneal cavity failed to yield any fluid. A small tuberculous gland removed from the angle of the left jaw yielded tubercle

bacilli of bovine variety. There was no history of contact, and no evidence of pulmonary involvement on physical examination or X-ray.

Case No. 12-13. J.G., age 6 years. Admitted to the Hospital for Sick Children with a clinical diagnosis of Chronic Tonsillitis and Mastoiditis. Both tonsils and adenoids removed at operation yielded tubercle bacilli of bovine origin. Two years previously this lad had tuberculous cervical glands removed. For one year previous to his first operation (1926) he had lived in Scarboro, and had been fed on unpasteurized milk of the district. (See Case No. 5.)

Case No. 14. J.D. Admitted to the Hospital for Sick Children with a clinical diagnosis of Tuberculous Tonsillitis, Cervical Adenitis, and Tuberculous Mastoiditis. A typical strain of bovine tubercle bacillus was recovered from pus from the mastoid process. (See Case No. 5.)

Case No. 15. E.R., age 8 years. Admitted to the Hospital for Sick Children from Scarboro, with a clinical diagnosis of Tuberculous Cervical Adenitis, and Chronic Tonsillitis. The tonsils removed at operation yielded tubercle bacilli of bovine origin. This child has at intervals been fed on raw milk of the district. (See Case No. 5.)

SUMMARY

It will be noted that in our studies upon the nature of tubercle bacilli isolated from children, we have identified 190 strains recovered from both medical and surgical cases of tuberculosis. Of these, 160 strains proved to be of human variety, and 30 strains, recovered from 20 different patients, proved to be of bovine origin.

In the majority of the cases from which the human type of the tubercle bacillus was recovered, a history of contact to open pulmonary tuberculosis was obtained, and in a certain proportion of our surgical cases there was evidence of tracheo-bronchial or pulmonary tuberculosis, demonstrable on physical examination or X-ray. All these children reacted to tuberculin.

Thirty strains of bovine tubercle bacillus were recovered from twenty patients in our series, the oldest being a patient twelve years of age, and the youngest an infant of five months. In most of the cases investigated, a direct relationship with infected milk was demonstrated. In the majority of the cases, the milk relationship could not be demonstrated by complete laboratory methods, though the history in many of the cases indicated that the child had received quantities of raw milk. Wherever possible, we have endeavoured to obtain milk for bacteriologic examination and guinea-pig inoculation. In one of our series of cases studied, we were able to demonstrate tubercle bacilli in the milk.

It is of interest to note that the bovine strains isolated were recovered from different sources, namely, cerebro-spinal fluid, meninges, lymph glands, mastoid process, tonsils, adenoid tissue, kidneys, and in one

instance, from the sputum. Of these regions, the lymph glands, particularly those of the neck, were the most common sites of infection.

All these children came from districts in regions where pasteurization of milk was not carried out. None of the children, with the exception of one case, showed evidence of pulmonary or tracheobronchial tuberculosis, either on physical examination or X-ray, the evidence pointing to the alimentary routes of infection.

Fom this limited study upon the incidence of bovine infection in children in this community, it would appear that:

1. Bovine tuberculosis is a factor in childhood infection in rural Canada, and in unpasteurized areas. The incidence of infection is probably far greater than we are aware of.

2. Milk is the vehicle for the transmission of the bovine tubercle bacillus.

3. Tissue localization of the bovine tubercle bacillus is peculiar to certain regions, the lungs being practically immune.

4. In the Toronto district, which is a pasteurized area, not a single case of bovine infection has been recovered up to the present.

5. If we may be allowed to draw conclusions in terms of percentage incidence from this small group of cases studied, about 12 per cent of surgical tuberculosis in children, leading to operation, disablement and disfigurement, and occasionally leading even to the death of the child, is preventable, and can be easily controlled by the simple means of pasteurization, or boiling of milk.

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The Evaluation of Diphtheria Immunization Work

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IN the appraisal of the results following any specific activity of the health department, the effects of the efforts of the particular health organization must be differentiated from the ever present and potent factor of chance. Health workers will do well to realize that, long before many health departments were even thought of, mortality rates of many diseases, diphtheria included, had already started to decline, and, in many instances, might have been much as they are to-day, had the health departments never been established. Therefore, if the health officer wishes to show that the particular activities in which he has been engaged have had the desired effect, he must show that the results achieved are beyond the range of that which could reasonably have been expected in the ordinary course of chance, as judged by past experience.

A great many cities, provinces and states have very good data from the present back thirty to fifty years. With such data available it is a simple matter indeed to plot the past experience and forecast for the immediate future the probable trend and annual fluctuations of the data, and to evaluate therefrom any significant variations in terms of work accomplished as the result of specific efforts applied. To illustrate, let us observe the data for Cambridge, Mass., as shown in Figure 1. Cambridge has a population of about 122,000. The available data have been plotted as the logarithms of the diphtheria mortality rates on plain cross-section paper. The trend has been drawn in by inspection and centered so as to be midway between all the frequencies from 1879 down to 1925. The slope of the trend, as drawn, is 5 per cent per annum. The trend line indicates the theoretic or expected annual rates. The expected rate for any given year is 105 per cent of that for the next succeeding year. The standard deviation (S.D.) has been calculated as follows:

$\sqrt{\frac{\Sigma D^2}{N}}$ = the square root of the average of the square of the deviations from the trend = ±S.D. where ΣD^2 = the sum of the square of the deviation of each rate above or below the trend and N = number of years under observation.

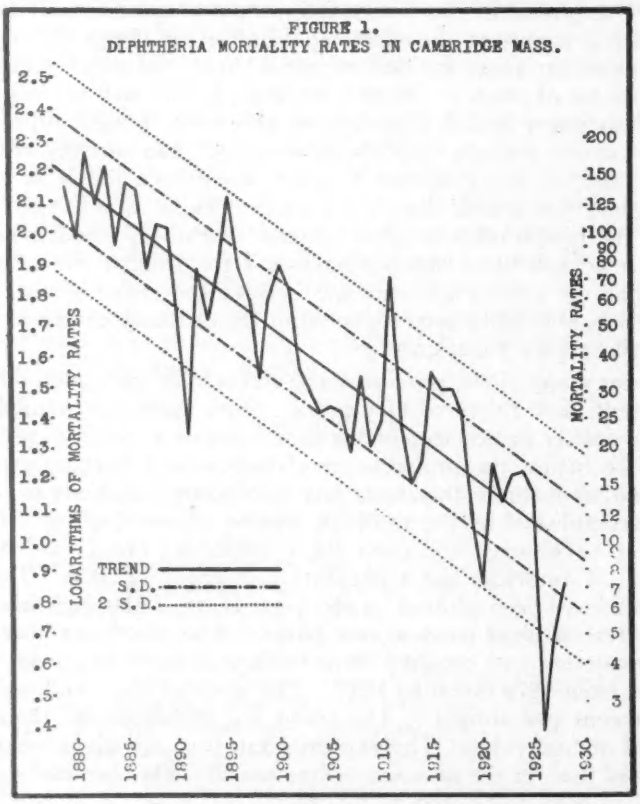
Lines have been drawn in indicating the limits of the range of the ±S.D. The interval represented by ±S.D. is equal to 47 per cent. The relative percentage values of the various points in any one year are as follows:

−S.D. = 147% of −2 S.D.
Trend = 147% of − S.D.
+S.D. = 147% of Trend
+2 S.D. = 147% of + S.D.

Or let the trend equal 100%, then

+2 S.D. = 217%
+ S.D. = 147%
Trend = 100%
− S.D. = 68%
−2 S.D. = 46.1%

FIGURE 1.
DIPHTHERIA MORTALITY RATES IN CAMBRIDGE MASS.



According to the observed experience of Cambridge, during the period 1879-1925, we expect that in the immediate future, provided that the same conditions hold as have prevailed in the past, 66 per cent of diphtheria mortality rates will fall between the limits of S.D. above or below the trend, and 95 per cent will fall somewhere between the limits of 2 S.D., and five times in 100 years the rates may fall above or

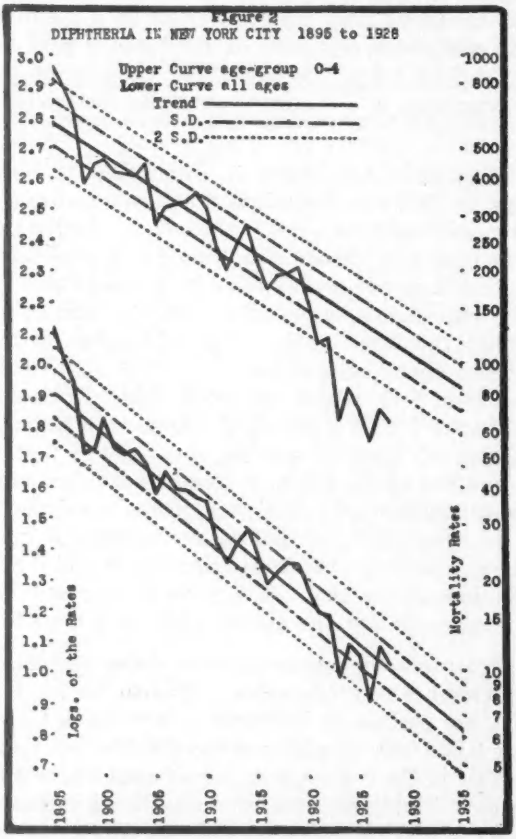
below 2 S.D., due to the effect of chance alone. Note that in 1891, four years before the introduction of antitoxin, the rate fell from above the trend to about 3 S.D. below the trend, returning to slightly above the trend the following year. Obviously this was an occurrence due to pure chance and in no wise exceeding the range of probability. Anything that can happen may happen anytime, by the operation of chance alone, yet we know by experience that chance events tend to group themselves about their mean or trend in a manner that can be predicted with reasonable certainty on the basis of past experience. A rate as low as 3 S.D. below the trend, like the rate of 1891, would be expected to occur once in a thousand years by the operation of chance alone.

About 1922, Cambridge began to immunize its children against diphtheria, and in 1926 the diphtheria death rate dropped from 14.1 to 2.4, a drop of more than 4 S.D. below the trend. Such a drop may have occurred in the course of chance about once in considerably more than 10,000 years. Such an event may have been a pure chance occurrence, though highly improbable, especially if in the succeeding years the rates approached the trend again within the range of S.D. In 1927 the rate was below the trend a distance of 2 S.D. In 1928 the rate was 7.2 and is less than S.D. below the trend line. Does this mean that the low rates of 1926-7 were a streak of rare good luck and that the rate is returning to its old level, or was the rate of 1928 just a rather high chance of fluctuation above the new trend established since 1925 as a result of toxin-antitoxin work? Cambridge has immunized about 9,000 children and the writer believes that we are justified in concluding that the drop in the rate during 1926-7 was significant and due to the toxin-antitoxin work done in the city. The rates for the next few years will demonstrate whether or not the above conclusion is justified.

Figure 2 illustrates the importance of using specific rates, where available, in preference to crude rates. Diphtheria mortality rates for New York City are plotted as indicated. New York City has a population of about 6,000,000, of which about 600,000 are under five years of age. Note that in the lower curve, for all ages, there is no significant drop in the rates following the extensive diphtheria immunization work done by the city health department. Does this mean failure on the part of toxin-antitoxin to stand up to what we are led to expect of it, or are the results obscured by some other influence? Observe the curve for the children of New York City, and the influence of immunization is at once apparent. An immunization campaign, to be so effectual as to produce such results in a city the size of New York, is of such magnitude that these results reflect great credit on the officials and workers responsible for the work. The significant drop in the specific rates for the 0-4 age group is totally eclipsed when the crude rates for all ages are calculated, for in the 0-4 age groups practically all are susceptible

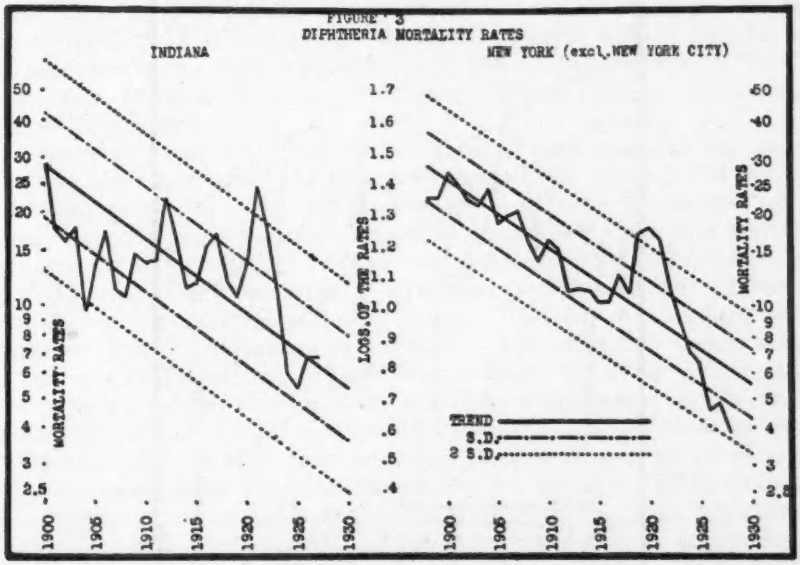
to diphtheria, while in the total population probably 4,000,000 could not take diphtheria if they were exposed to it.

In Figure 3 the diphtheria mortality rates for Indiana and New York State (exclusive of New York City) are drawn to illustrate some of the pitfalls in drawing conclusions from inadequate data. New York State has been working since 1922 in an effort to immunize its



child population against diphtheria, and by June, 1928, had immunized a total of half a million children. Two cities, Syracuse (185,000 population) and Auburn (40,000 population), have reduced their diphtheria mortality to near zero, and many smaller cities, towns and counties have done likewise. Note, however, that the crude rate curve, for the state as a whole, does not show as yet a significant drop, although it may well be said to approach significance. On the other hand Indiana data look rather significant. Neglect for the present

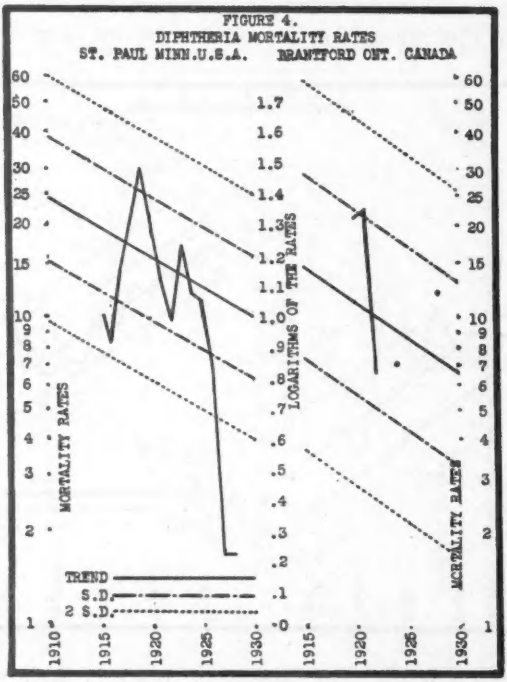
the trend and S.D. lines, as drawn in, and consider the data without respect to other known data. There has been some immunization work done in Indiana since 1922. The rates are seen to fluctuate between 25 and 10 throughout the period 1900-23 about a mean of 15.45, the log. of which is 1.189. Calculating the S.D. about this mean we get S.D. = ±.120. Then the rates for 1924 to 1928 are highly significant, being over 3 S.D. below the mean for three years in succession. Does it follow, then, that Indiana data show more results from diphtheria immunization than do those of New York State? In the first place we know that enough immunization has not been done in Indiana



to produce such a result. In the second place, a little reflection will satisfy the observer that there is no reason to think that Indiana has not participated in the general decline in diphtheria mortality, in like manner with other states. Let us, then, draw into Indiana's data the trend more or less common to the U.S.A. and calculate the S.D. as in the Figure 3. Now the deception due to inadequate data is apparent. Indiana data go back only to 1900, so we have no idea what the rates were prior to that date, but they were probably similar to those of New York State. If that is true and the trend, as drawn in, approximates the true trend, then the present rate of diphtheria mortality of 5.7 is but the expected rate. Some two or three years ago, a writer, in a burst of enthusiasm, illustrated graphically Indiana diphtheria death rates from 1921-25 to show "Diphtheria on the run in Indiana." Truly it was on the run, but from the rather high epidemic rate of 1921

back to the expected rate of the trend. Such propaganda is of very doubtful value and should be discouraged.

In the discussion of the data for Cambridge, Figure 1, we saw how simple it is to differentiate between the effects of chance and of public health work, where adequate data are at hand. But what are we to do when we wish to evaluate the immunization work done in a city where old data are not available?



In Figure 4, the diphtheria mortality rates for St. Paul, Minn., and Brantford, Ont., are plotted, in so far as the data are available to the writer. St. Paul's data are from 1915 to 1928 and those for Brantford from 1920 to 1928. These two series of data were chosen because they are representative of a great many cities for which the data have only recently been recorded. Obviously it is quite impossible to estimate the trend or annual fluctuation of the rates in either of these series. Both represent cities in which intensive diphtheria immunization has been done and are therefore of great interest.

Data for Minneapolis, St. Paul's twin city, are available back as far as 1890. The trend of diphtheria in both cities would, no doubt, be similar, therefore the trend of Minneapolis data is drawn into the graph

for St. Paul. St. Paul has a population of 248,000 and Minneapolis a population of 434,000. The S.D. for Minneapolis is ±.192 and would naturally be less than that of St. Paul because of the difference in the size of the population. New Haven, Conn., has a population of 185,000 and the S.D. of its diphtheria rate is ±.207. Since St. Paul's population is between that of Minneapolis and New Haven, the S.D. ±.200 has been chosen for St. Paul and drawn in accordingly. These trend and S.D. lines are necessarily inaccurate, being only estimated, but the writer believes they are accurate enough for the purpose in hand and are of value, when their deficiencies are known and appreciated. Now, according to Figure 4, as drawn, the rates for 1927 and 1928 are seen to be below the trend more than 4 S.D., and therefore significant. Since 1924, St. Paul has immunized 32,000 children against diphtheria. These two facts, taken together, justify the conclusion that St. Paul's favourable diphtheria death rates during 1927 and 1928 are the result of diphtheria immunization.

In Brantford's data, only five points out of nine years can be shown; in the other four years the rates were zero. The logarithm of zero is minus infinity, it is therefore impossible to indicate its position on a ratio graph. Since we cannot calculate a trend for this series of data, because of its brevity, let us draw into it the trend for diphtheria rates in Ontario. The population of Brantford is about 30,000. Auburn, N.Y., has a population of under 40,000. The S.D. of the diphtheria mortality rates for Auburn is ±.296, so a S.D. of ±.300 should fairly represent that for Brantford and is accordingly drawn in. Obviously a reduction of the rates to two would be a significant reduction, if maintained, and we find that for the three years 1925-27 there were no deaths at all. In 1928 there were four deaths, three of which were of children and one an adult, all unprotected by diphtheria immunization. In a population as small as that of Brantford, the rates are always unstable, and conclusions based on them must always be tempered with judgment. Brantford has immunized over 8,000 children against diphtheria. Knowing this fact, one is justified in concluding that the reduction in diphtheria deaths in Brantford was not just a run of good luck, but the direct result of the intensive application of modern preventive medicine in the form of diphtheria immunization.

The writer has data from a large number of cities, provinces and states of Canada and the United States, and has found only eight cities in which the rates show a sufficient reduction to warrant the conclusion that the favourable results are the effect of the intensive use of diphtheria immunization. The eight cities referred to are as follows:

Hamilton and Brantford, Ont., in Canada; New York City, Syracuse and Auburn, N.Y.; New Haven, Conn.; St. Paul, Minn.; and Cambridge, Mass., in the United States. There are, no doubt, others that have not come to the writer's notice as this survey has been in no sense complete.

SUMMARY

1. In the evaluation of the results of public health activities, the data should be studied in terms of their trends and standard deviations, in order to differentiate between the ever present factor of chance and the result of public health activities.

2. Where possible, specific rates should be used in preference to crude rates. Valuable information may be obscured in crude rates, which will be made obvious by the study of specific rates.

3. Inadequate data are often responsible for erroneous conclusions. If such must be used they should be interpreted in the light of the experience of other similar communities having adequate data.

4. Vital statistics are but one line of evidence, and should always be studied in conjunction with all other available findings before drawing definite conclusions.

"Natural" Ventilation Conduces to Pupils' Health

RESPIRATORY diseases are much more frequent in children who attend recently constructed schools with forced draft than in those who attend old schools in which heat and gravity were the principal factors of air exchange. This conclusion appears in a preliminary report of six schools of Syracuse, N.Y., made by the New York State Commission on Ventilation. Similar studies in 1 and 2 room rural schools of Cattaraugus County, New York, confirm previous findings of the commission that rooms with moderate temperature show lower rates of "respiratory illness than do those which are overheated or underheated."

The New York commission has resumed its studies in New York City in four public schools which have been placed at its disposal for observation of the effect of different atmospheric conditions upon pupils. *School Life, February,* 1929, p. 109.

The Control of Communicable Diseases*

By

R. O. DAVISON, M.D.

Director, Division of Communicable Disease, Department of Public Health, Saskatchewan

IT appears superfluous that I should dilate at all on the health organization of this Province when addressing a convention of health officials. I will therefore only recall briefly the field of official agencies, and in proceeding, trust something may be said which will induce a brisk discussion; for, after all, it is in the discussion of various points that are brought up that most value is obtained.

The Department of Public Health with its divisions has the supervisory, advisory and educational responsibilities relating to public health placed upon it, with the full responsibility for the control of communicable disease placed squarely upon the municipal boards of health and their medical health officers. May I also add, that, although duties and responsibilities are placed upon the boards, similar duties and responsibilities are placed upon the medical health officers, by the Public Health Act. So long as the physician holds the appointment of medical health officer, he is obliged to carry out the provisions of the Act and Regulations, irrespective of whether the board of health agrees with him or not. The recourse left to the board in case of disagreement is to dispense with the services of this official, at its pleasure. While this is a bald statement of the situation, I think it very rare that any board or council would care to assume the technical responsibility which rests on the medical health officer, and disagree with him on a purely technical matter relating to the control of communicable disease.

I realize, of course, that many physicians feel that, in holding the position of part-time medical health officer, the position unduly interferes with one's private practice, in that it causes friction with those persons who may be prospective patients, and on account of action he, as medical health officer, may have to take, they may seek medical advice elsewhere. There appears to be no doubt such instances do occur, but I think you will find the great majority of residents of any community will appreciate prompt, efficient and reasonable action on

**Delivered at the Convention of the Saskatchewan Health Officials' Association at Saskatoon, Oct. 9th, 1928.*

the part of any medical health officer in the prevention and control of communicable disease. With the weight of public opinion behind him, I cannot see where, in the end, the physician's practice will suffer. On the contrary, the development of a wholesome respect in the mind of the greater part of the community will rather increase his practice.

May I quote here from a paper given by Hugh Cummings, M.D., Surgeon-General of the United States Public Service, on "The Relation of the Private Physician to Public Health." He states the following paragraph as one of his conclusions:

"From time immemorial the medical profession has been regarded as the natural sponsor, not only of individual but also of community health. Legal provisions relating to the standards of medical education and privilege of the practice of medicine rest on this foundation. Whether this service in future shall be rendered by the profession, in co-operation with the health authorities, or be made incumbent on the legal health representatives, must depend upon the character of the service rendered by the profession. It should be the object of the organized profession to impress upon each individual physician his responsibility in this matter."

So far as official duties of the medical health officer interfering with private practice are concerned, I would point out that in villages and rural municipalities in this Province, the Regulations make the "attending physician" responsible for placing quarantine and isolation, and reporting to the medical health officer that such has been done. The medical health officer is not required to visit the home to enforce the regulations, except in non-observance and in the investigation of unreported cases. Therefore, what difference does it make whether you be a private physician or a part-time medical health officer? In both cases you may have to offend the persons concerned in order to protect the community, if we are to assume that offence is to be taken over such action.

The Hon. Dr. J. M. Uhrich, Minister of Public Health, in his Budget speech last March, stated as follows:—

"In the protection of the public health from the inroads of preventable and communicable disease, it is necessary that restrictions be placed upon the liberties of the infected individuals; yet, after years and years of the application of restrictive measures, no indications exist of their efficiency in eliminating epidemic disease.

"Keen observers of public health practice are therefore gradually coming to the conclusion that active immunization is the only efficient agent available to eliminate the hazards of epidemic disease, and this is true in direct proportion to the use the public will make of this knowledge. The epidemiology of the future, so far as endemic infections are concerned, lies with active immunization. That no other method known to us offers the least hope of stamping out these infective diseases, which, as it were, have grown up as a part of our civilization, has been made increasingly apparent by the accurate study of human epidemics."

Most of you know that five years ago the Department began a campaign for the prevention of diphtheria by active immunization, and the publicity in connection therewith has apparently stimulated a demand on the part of the public for immunization against diseases other than diphtheria, including smallpox and scarlet fever. The results so far obtained from the diphtheria campaign are very interesting, and while it cannot be stated definitely that the number of persons immunized has been the sole cause of the improved conditions, we can certainly state that the improvement has been coincident with the use of toxin-antitoxin and toxoid. In the past five years the reported cases of diphtheria have been reduced from approximately 1,000 cases yearly to 581 in 1925; 470 in 1926; and 369 in 1927. The reduction in mortality is just as marked, and here we feel the figures are accurate and not dependent on any irregularity in the reporting of cases. From over 200 deaths annually in 1922-23-24, the annual deaths decreased to 127 in 1925; 116 in 1926; and only 55 have been recorded so far for 1927.

I have been surprised in looking over our records to note the amount of scarlet fever toxin for active immunity that has been distributed since 1925. Sufficient has been sent out to immunize approximately 18,000 persons, and this without any publicity directed to its use. I cannot avoid feeling that the results being obtained from the use of diphtheria toxoid have had a distinct bearing on this distribution. I would like to state, however, that while I think this treatment is of very definite value, I feel it belongs largely to the field of private practice, except where, in cities or larger centres, and institutions, the procedure can be satisfactorily carried out. The lengthy course of treatment and the mortality from scarlet fever hardly warrant a provincial programme. Scarlet fever is not, nor has it been in recent years, of sufficient severity to justify an intensive drive for active immunization. During the past five years the deaths have ranged between 23 and 40 out of 800 to 1,000 cases reported annually. Especially is this the case when scarlet fever antitoxin is available, free of charge, for treatment, and such good results have been obtained from its use. Please understand that I think this immunization should be used and used freely by the practising physicians in order to avoid those insidious infectious complications, which so often follow the disease, if for no other reason, but I am referring to "drive methods."

It seems unnecessary that anything should have to be said to-day regarding smallpox vaccination which has such brilliant results to its credit, but the course of smallpox in England and Wales as it is to-day is very interesting and instructive when we consider that it has been said that the whole story of smallpox has been written in England, and, as well, that England is the "home" of vaccination. In the ten years prior to the Vaccination Act of 1870, there were 58,218 deaths from smallpox. With compulsory vaccination the deaths for the ten years,

1907-1916, were only 139. However, in the 1870's the percentage of vaccinations to births exceeded 85, whereas to-day it is less than 40. This reduction is due to the effective action of the anti-vaccinationists, in 1898, in having inserted in the Act, their "conscientious objector's clause." Consequently, an unprotected population has grown up, and while only 63 cases were reported in 1918, in 1923 there were 2,504 cases and over 9,000 in 1927. Where vaccination is neglected, smallpox thrives, and I trust all of us may do our part in convincing the public not only of the advisability, but necessity, of protection against smallpox by vaccination. There are only two preventatives, vaccination and the disease itself.

So much publicity has been given by public health authorities to the prevention of those communicable diseases against which we have specific methods of active immunization, that sometimes it would seem too little attention has been paid to those so-called minor communicable diseases, such as mumps, chickenpox, measles and whooping cough. It may be true that mumps and chickenpox are considered mainly from the standpoint of the prevention of economic loss and, with chickenpox, the detection of smallpox, but it is unfortunate that measles and whooping cough are classified by the public as minor diseases. No doubt this impression is largely due to the fact that most children are affected at some time, and the great majority appear to be no worse for the experience. True, the fatality rate from these two latter diseases is not high, but the mortality per hundred thousand of population for both measles and whooping cough shows a rate greater than scarlet fever and approximately half that for diphtheria, when considered over a ten-year period. The mortality returns for the year 1926 show that measles caused two (2) more deaths, and whooping cough only eight (8) less, than diphtheria. Each of these two so-called minor diseases caused more than four (4) times as many deaths as scarlet fever. In 1926, measles was responsible for 118 deaths; whooping cough, 108; diphtheria, 116; and scarlet fever, 23 deaths.

Unfortunately, in the control of these two conditions we have to depend upon restrictive measures, and both are so highly communicable before sufficient signs are evident to make a diagnosis that many of our efforts are futile, the diseases as a rule only subsiding in a given area when the susceptible population has been rendered immune by reason of an attack. When a new susceptible population of young children has grown up to provide fertile soil for the infections, we encounter a fresh epidemic.

It is encouraging to note, however, that investigators are labouring unceasingly to find a method of active immunization and some observers are daring enough to hold out hopes that such methods may be forthcoming in the near future. A vaccine is at present on the market for the prevention of whooping cough, and while some good reports have been made regarding it, yet experience so far would

indicate that it is not entirely satisfactory and needs perfecting. Science has not advanced quite so far with measles, but temporary immunization has been induced by the use of convalescent serum taken from patients recently recovered from the disease. The serum under favourable conditions may be made use of in postponing the time of infection in young children, under the age of three years being the most dangerous period of life; or, in modifying the severity of the attack, by administering it during the latter part of the incubation period of the disease.

So it may be seen that progress is being made, and it is hoped that the time is not far distant when it will be possible to induce active immunity to both measles and whooping cough and thus prevent, or at least reduce, the large number of deaths occurring annually from these diseases.

Just a word on disinfection before closing. Any action taken to prevent the spread of disease should be based upon some reliable data, and deductions, drawn from the data, warranting such action, proved in so far as possible by epidemiological studies, including laboratory confirmation. Methods of disinfection should be on this basis. We know that bacteria require warmth, moisture and food in order to live and multiply, the growth of these organisms in their host being the cause of infectious disease. Depriving the bacteria of the three essential factors for existence is the basis of disinfecting methods now recommended so far as the environment is concerned. Pathogenic organisms do not live for any length of time in an environment foreign to their requirements, and all studies of recent years tend to prove that man himself is the great disseminator of infection, either directly or indirectly, to his fellow man, rather than the environment surrounding him. Inorganic objects can only be indicted when they are freshly soiled with secretions or excretions from an infected individual. Dryness, promoted by sunlight and fresh air and augmented by thorough cleaning, is one of the most potent agencies we have in disinfection and most easily applied.

As I warned you at the beginning, I have only touched upon a number of points in connection with communicable disease, in probably a cursory sort of fashion, but if I can hope that I have raised some question in your minds which will provoke serious thought and discussion, I feel reasonably sure some beneficial result may be evolved.

Sydney Kiwanis Health Camp

Contributed by

MARGARET MACKENZIE, REG. N.

Department of Public Health, Nova Scotia

SYDNEY, an industrial city, which has the largest steel plant in Canada, is situated on the extreme eastern coast of the Province of Nova Scotia and is a terminus of the Canadian National Railway. It has a population of 22,545 (1921 census), with a school registration now of about 5,500, of whom 500 are attending high school. In 1927, the Provincial Health Officer offered the medical officer of health of Sydney the nursing and management service for a summer camp for mal-nourished children, and the Nova Scotia Tuberculosis Commission donated two hundred dollars for its maintenance from the Christmas seal sale fund of the previous year. With a contribution of $213.30 from the Sydney Branch of the Red Cross Society and smaller ones from several of the local organizations, meagre equipment for thirty persons was purchased and a cottage rented for a month. This money covered the cost of maintenance for this period with the exception of blankets which were loaned by local institutions.

Twenty-seven underweight girls between the age of six and fourteen years, chiefly tuberculosis contact cases, were admitted to this camp, and twenty-one of them remained almost four weeks. During this period one of these gained seven pounds, another gained six pounds and six more gained five pounds each. In addition, the others made satisfactory gains.

A member of the Sydney Kiwanis Club, who was familiar with the activities of the camp, was so impressed with the value and benefit of this undertaking, that he at once started a campaign to interest the members of the Sydney Kiwanis, with such excellent results that a forty-four-bed camp was built and equipped for occupation by July 2nd, 1928.

The camp is ideally situated on the beautiful Mira River, twelve miles from Sydney and five miles from the sea front. Delightfully clear sea water goes fifteen miles up this river and the distance from the coast makes bathing much more comfortable. Among other interesting tales related of this locality, it is said that from this river, many years ago, was taken by the French the stone that was used for the building of the fortresses in the historical town of Louisburg, which is situated twelve miles from the camp.

The children were selected by the Sydney school nurse and the city

medical officer of health, and on July 2nd, 1928, forty-four girls were admitted to the camp. Owing to the assistance of generous donations the camp was maintained for two months, so that when the girls completed the four-week period, the same number of boys joyously started theirs. The superintendent of the provincial public health nursing service and two nurses loaned by the Nova Scotia Tuberculosis Commission divided among them the management of the camp and the care of the children. The school nurse of Sydney generously gave two weeks of her vacation period when the camp was first opened. The children, knowing her well, did not have the longing for home which usually occurs for a few days in new surroundings. The home-sickness

being conquered, the children under twelve seemed to thoroughly enjoy the camp life. Over this age, they apparently missed the city excitement and their accustomed late bed hour.

As it was difficult to obtain competent service, it was necessary that two nurses remain on duty. It was gratifying to find that the restless children of the previous year were excellent leaders for the new ones. The previous year's children, having been given tooth brushes and shown the proper care of the teeth, returned in 1928 with marked evidence of attention. One of them had acquired such a perfect method of the use of a tooth brush that she made an excellent demonstrator in the tooth brush drill.

The Camp Life.

Very good wholesome food was provided. Several of the older children were able to give some assistance with the serving of the food

and each one occupied his or her own place for meals. A dessert-spoonful of cod-liver oil was given to each child after the afternoon rest period, and this seemed to be regarded as a luxury. The oil was followed with fruit. The donations of ice cream and other treats were always greatly appreciated. Milk and porridge were taken very reluctantly by some during the first few days at camp, but this difficuly was soon almost completely overcome. The letters that were written home by them always mentioned the suppers that were served out of doors and the cod-liver oil and the extras that were distributed to them.

GROUP OF UNDERWEIGHT GIRLS.

Left to Right:							
Dorothy	age	10	yrs.	1	mos.	gained 5.0	lbs.
Jennie	"	11	"			" 7.25	"
Margaret	"	8	"			" 2.25	"
Helen	"	9	"	11	mos.	" 5.25	"
Olive	"	7	"	11	"	" 3.75	"
Kathleen	"	10	"	10	"	" 2.62	"

A daily programme was closely followed. Each child was expected to keep his or her bed and personal property in a tidy condition and after considerable instruction they were able to make up their beds quite well. They all rested for two hours every afternoon and many new habits were developed. The summer was an ideal one for camping and sea bathing was usually taken twice daily. No accidents occurred and no illnesses developed with the exception of that of a crippled boy who, due to illness, was taken home within a week of his admission. During a severe electrical storm, the children all remained very calm and were only slightly disturbed.

Remarkable progress was made by a crippled girl who could scarcely stand alone on her admission but undertook to dance previous to leav-

ing. After her first day she seemed extremely contented and, in addition to her very satisfactory gain in weight, she had lost her wan appearance. Previous to the changing of her surgical dressing each day, she enjoyed her dip in the water and this was followed by outdoor sunlight exposure.

Records

Records were kept showing the age, weight, height and the percentage under weight* on admission. Each child's weekly weight was recorded with red ink on a chart which showed in black ink the average weight and gain for a month. Different coloured stars were attached each week to the charts of those who rested well, took meals well, and the ones who made the greatest gain in weight for each group of the same year of age. These charts were kept on the dining room wall and were of keen interest to the children and the many visitors.

The records showed that the seventy-two children who remained in camp for three or four weeks gained an average of 4.03 pounds each, which is a gain of 3.57 pounds for each child over the average expected gain for this period*. Eight additional children spent between one and two weeks in camp and thirteen more were there for less than a week.

The underweight percentage of the children who were in camp for a week or more was as follows:—

Girls on Admission

4	less than 7	per cent	under	weight				
7	between 7	and	10	per cent	under	weight		
9	"	10	"	15	"	"	"	"
9	"	15	"	20	"	"	"	"
5	"	20	"	25	"	"	"	"
5	"	25	"	30	"	"	"	"
3	"	30	"	35	"	"	"	"
3	"	35	"	40	"	"	"	"
45								

Same Girls Last Week in Camp

16	less than 7	per cent	under	weight				
5	between 7	and	10	per cent	under	weight		
9	"	10	"	15	"	"	"	"
4	"	15	"	20	"	"	"	"
5	"	20	"	25	"	"	"	"
1	"	25	"	30	"	"	"	"
5	"	30	"	35	"	"	"	"
0	"	35	"	40	"	"	"	"
45								

Boys on Admission

9	less than 7	per cent	under	weight				
0	between 7	and	10	per cent	under	weight		
2	"	10	"	15	"	"	"	"
8	"	15	"	20	"	"	"	"
6	"	20	"	25	"	"	"	"
3	"	25	"	30	"	"	"	"
3	"	30	"	35	"	"	"	"
1	"	35	"	40	"	"	"	"
1	lame boy was 46.7				"	"	"	"
33								

Same Boys Last Week in Camp

9	less than 7	per cent	under	weight				
5	between 7	and	10	per cent	under	weight		
5	"	10	"	15	"	"	"	"
6	"	15	"	20	"	"	"	"
4	"	20	"	25	"	"	"	"
1	"	25	"	30	"	"	"	"
2	"	30	"	35	"	"	"	"
0	"	35	"	40	"	"	"	"

on admission and 41.6 per cent under weight the last week in camp.

Dr. Emerson's weight and height chart was used in the preparation of this report and only bathing suits were worn by the children when being weighed.

The turn-over of the girls was considerably less than that of the boys, no doubt largely due to the camp experience of some of the girls the previous year. In addition, when a bed was vacated by a girl, arrangements were immediately made to obtain another child to fill the vacancy and all the beds were kept occupied, but this was not done during the period that the boys were there.

Forty-one of the girls gained an average each of 4.25 pounds in four weeks with a gain of 3.68 pounds over the average normal gain, and thirty-one of the boys gained an average each of 3.81 pounds in three weeks with a gain of 3.46 pounds over the average normal gain. (The weight record of the girls was summarized after their four-week period in camp was completed, but the weight record of the boys was not obtained after their three-week period there.)

The gain in weight of seventy-seven of these children was as follows:

4	girls	and	0	boys	gained	between	7	and	8	pounds
2	"	"	3	"	"	"	6	"	7	"
7	"	"	5	"	"	"	5	"	6	"
9	"	"	9	"	"	"	4	"	5	"
12	"	"	5	"	"	"	3	"	4	"
7	"	"	7	"	"	"	2	"	3	"
3	"	"	4	"	"	"	1	"	2	"
—			—							
44			33							

Two sisters and one brother during their camp period gained an average of 6.3 pounds each and their underweight percentage was reduced as follows:

Charlie	gained	6.5	pounds—	underweight	percentage	reduced	from	20.3	to	8.4
Helen	"	5.25	"	—	"	"	"	"	16.3	to 8.5
Jennie	"	7.25	"	—	"	"	"	"	10.1	to .7

The results of the camp work for all the children have been most gratifying but these three, Charlie, Helen and Jennie, made outstanding progress. They were exceptionally good milk drinkers and this no doubt helped considerably in the accomplishment of this remarkable gain.

This camp is the property of the Sydney Kiwanis Club and they now aim for its further development. The establishment of new service always encounters many difficulties that may be later eliminated. However, this particular achievement of camp work has been most encouraging to interested persons and it should also have a very far-reaching effect on the life of every child who may be privileged to spend some time there.

The Teaching of Health in the Elementary Schools*

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THE aim of this paper is to present the modern conception of a health educational programme and its development in the elementary school; that is, one where instruction is given to grades I to VIII. A school health training programme is indispensable and it is concerned with everything connected with the school and its activities. School sanitation and school health service largely form the school health programme as a whole, and are definitely related to the educational field.

The change from the subject titles of hygiene, anatomy and physiology to health training and instruction is significant of the modern aim, which is: firstly, to establish in the school a programme of health teaching, in which health behaviour is the chief end sought, and knowledge of health facts is contributory; secondly, to build a health teaching programme upon a knowledge of the child's nature, his needs and instinctive desires, and a knowledge and application of those principles of mental hygiene and psychology that apply to methods of teaching; thirdly, to relate and co-ordinate health training and instruction with the health requirements of the pupils and community, as well as with all school activities.

It has been proved that in the elementary school, health cannot be taught entirely as a subject nor can it be left wholly to incidental treatment occasioned by situations, or to other related activities, i.e., physical education or domestic science. Just what amount of time should be allowed is open to question. At present it depends upon the interest and vision of the health teachers.

The outline of the general plan of school health education, approved by the National Educational Association and the American Medical Association, has been used in Manitoba with satisfactory results. Other provinces have had the same experience. In Manitoba (outside of Winnipeg), due to the close co-operation between the Department of Health and Public Welfare and of Education, the change in teaching was begun eleven years ago through the work of the public health nurses in stressing health habits in their class-room talks. The health

*Presented at the Annual Meeting, Canadian Public Health Association, Winnipeg, October 1928.

rules were also emphasized by nurses in the Little Mothers' League classes for grade VIII girls, on the ground that it was necessary for them to know how to care for themselves before they could be fit to care for others. In the Little Mothers' Leagues was found the need for more thorough instruction in physiology and hygiene in the senior grades; and as this instruction was indispensable, we included the elementary facts of these subjects. In addition, to fill a need found through community work, an experiment was made of training girls in the care of children as well as infants, and in home nursing and first aid.

Our present programme has been built upon an adaptation of the Modern Health Crusade plan, which the National Tuberculosis Association started in the United States. For the first year we asked the teachers to conduct the health crusade as a method of introducing the "health chores." A method for carrying on this work was submitted to the teachers. After a trial period the "health chores" were printed in leaflet and poster form to stimulate interest and fix the attention of children upon them, and health chore records were prepared to place the habit observance on a permanent basis. The school boards also did their part by providing banners for the classes receiving the highest score. The Health Crusade was then promoted in all school districts through the Public Health Nursing Service, whether public health nurses were stationed there or not.

Of course there was adverse criticism—that it took too much time, that it demanded too much of the child, and had to do with conditions over which he and the school had no control, that it encouraged untruthfulness, etc. But it was felt that the idea was sound, and there was afforded one means of letting parents know and share in the school's effort of health training as well as enabling the teacher to gauge the home management of the pupils—i.e enough sleep, etc.

There were many difficulties, too, in the way of the nurses and teachers in carrying on the Health Crusade. How could Johnny have his frequent baths when he was sewn up for the winter? How could Mary brush her teeth when her parents could not afford or did not see the need of a mere tooth brush? How could Tom keep his nails clean when his family laughed such a procedure to scorn? How could Annie help drinking tea or coffee when there was nothing else to drink, milk being too valuable a commodity for family consumption—and who wanted to drink water when there was coffee around? How could all the Johnnies and Marys and Toms and Annies of the school world wash their hands after toilet and before eating noonday lunches which they had to bring to school, when there was no water, or soap, or towels? And how could they drink sufficient water when there wasn't enough to go round? And how could pupils apply the health rule relating to fresh air, when the school windows were carefully protected all through the year by three-holed storm windows? Again, with what success could a teacher promote good posture if pupils had to fit

the desks; or teach good care of eyes when the blackboard had nearly ceased to be a visual aid; or guard against colds among her charges when conditions in the school counteracted the benefits of her instruction, or impress the value of cleanliness of surroundings when the cleaning of the school was an uncertain affair? But these difficulties have not been insurmountable, and the success that has attended this venture of the Health Crusade has been due to the enthusiasm of the teachers.

While the campaign method of the Health Crusade served to stimulate efforts towards promoting and vitalizing a health teaching programme, we depended upon it only as a stepping-stone. The actual building of the programme has been a slow process, and is not by any means finished yet. So I shall briefly outline our programme at the present time for purposes of comparison.

In the first grade the health rules are taught one by one, as a part of the daily routine, through the following means: (1) The morning inspection. (2) The habit record, which is kept in a variety of ways, according to the ingenuity of the teacher—from a simple statement to the more decorative blackboard calendar. (3) The observance of health rules in the school. (4) Correlation with class work in which health ideas can be introduced judiciously. (5) Play activities, including physical exercises, and rest periods in which pupils can learn to relax.

Advantage is taken of their love of activity, of making things, of imitating, and of collecting, e.g. pictures for posters, etc., to make lasting impressions. Habits that are passed over at home as of no consequence assume importance through the authority of the school and the stimulus of emulation.

In grades II and III, health-habit training is continued as in grade I, and greater emphasis is placed upon discovering correlations between home and school practices, as pupils make progress in habit formation. Correlation of health ideas with other school studies and activities is also continued through word lessons, reading, writing, drawing, nature study, arithmetic, dramatizing, and physical training. Poster work provides unlimited lessons in drawing, painting, combinations of colours, words, writing and printing. Instruction is now begun in safety measures and elementary temperance information.

The health instruction and training in grades IV, V, and VI is carried on as in the elementary grades, and a beginning is made in relating health matters to citizenship, sanitation and the prevention and control of disease, and the placing of responsibility for the promotion of certain health projects through class organization of health clubs or Junior Red Cross branches, leading also to family discussion and interest. Correlations are continued in other subjects, for example, English, geography (both physical and commercial), history, civics and art. Formal instruction is carried on through the use of text books—

"The Canadian Health Book," by Porter and Fraser, and "Temperance and Life," by Miss McCorkindale.

In grades VII and VIII, previous knowledge and training is linked up with a prescribed course in physiology and hygiene, which has been introduced through the grades by the topics of breathing, posture, clothing, food, care of the teeth, eyes and ears, exercises, etc. Instruction is also continued in the principles of health, including the factors which affect the mental well-being; and correlated with information from other school studies, with practical application to the personal problems of the pupil, health problems in the home, the school and the community. In these grades, emphasis is placed upon community health service through instruction in public health measures, the function of boards of health, of hospitals and how they are maintained. This is developed by projects in the form of community surveys to find the health resources of the community in regard to public health services, milk, food and water supplies, prevailing kinds of foods, sewage disposal, sanitation of buildings, etc. Discussions of epidemics and accidents afford avenues to stress the importance of preventive measures, and the individual and public loss resulting from them.

In grade VIII, the course of instruction given through the Little Mothers' League for girls and First Aid Classes for boys has been organized into Home Nursing and First Aid classes. These classes are also held in co-operation with the Boys' and Girls' Club activities, and are conducted by public health nurses, either as part of the school work, or as an extra-curricular activity. Plans have been made to divide the course of instruction to Boys' and Girls' Clubs into junior and senior sections, and to award certificates from the Department of Health and Public Welfare on completion of the senior course. Nutrition classes are also conducted by public health nurses when needed, during or out of school hours, as may be deemed advisable by the teachers and nurses, to hinge this corrective work with habits conducive to a gain in weight and health.

That health teaching in the class-room is related to other health services has been amply demonstrated. For what teacher or nurse has not seen (out of the corner of her eye) the little chap who has surreptitiously rubbed his hands clean, or the vigorous nail-cleaning, or the wild waving of hands to leave the room in order to become better acquainted with soap and water before the class-room inspection. Even the white gown of the nurse seems to have an effect upon children in instilling ideas of cleanliness. All efforts for the control and prevention of communicable diseases, as well as the correction of defects, have a teaching value of much importance.

One point that should receive more consideration is the fact that pupils are quick to notice the discrepancy between the health instruction given and the daily practices in the school and on the playground. If you doubt this, you need only the experience of observing how closely

the monitor or guardian of the class-room thermometer is watched by the other pupils—to see that he reports regularly and correctly during the day. The casual passing by the thermometer on every available opportunity to note the temperature would be funny indeed if it were not for the motive involved.

As a means of helping and inspiring teachers in carrying on their health work, a bureau of information is conducted at the headquarters of the Public Health Nursing Division of the Department of Health and Public Welfare, and a department devoted to school health work is edited each month in the Western School Journal. Especially at the beginning of the school term is the office kept busy sending out material to teachers in all parts of the Province. In addition, competitions are conducted from time to time in posters, essays, scrap-books and health note books, etc. The Boys' and Girls' Club Field Days also provide an excellent opportunity of exhibiting the health work of the pupils. At the Child Welfare Stations the public health nurses are the proud possessors of many delightful posters, made by pupils under the direction of their teachers; and I might add that these arouse more interest both in pupils and parents than the posters designed by the best artists. I would like to acknowledge, too, the aid we have received from the excellent material prepared by health specialists of commercial organizations, as the Metropolitan Life Insurance Company, the Cleanliness Institute, and others.

With regard to methods and teaching content, there are differences of opinion that can only be settled by a thorough study of them, as whether it is better to teach health habits to primary pupils one at a time, or, as in Fargo, North Dakota, to teach them as a whole in a given order with the aim of uniting them as related rules of health living; or why it is deemed advisable to teach physiology in grade V in British Columbia, and is not required in Manitoba before grade VII. Perhaps even a review and comparison of the teaching content of health instruction outlined in the programme of studies in each province would be a means of stimulating interest in this field. Such studies could well be undertaken by the Canadian Public Health Association. Failing this, perhaps the Canadian Council on Child Welfare would develop this phase of child welfare work.

Nutrition classes are also conducted by public health nurses when needed during or out of school hours, as may seem advisable by the teachers and nurses—to hinge this corrective work with habits conducive to a gain in weight and health.

From the foregoing it follows that as health teaching is a full-time activity, we must depend upon the teacher as chief worker, with the public health nurse as her assistant and adviser in helping her to visualize the health needs of the pupils, the medical officer as a special teacher to quicken the interest of the children in particular health

problems, and likewise the school dentist to stimulate practice in the care of teeth.

And whose responsibility is it for promoting health teaching? From experience it is felt that it is the joint responsibility of the Departments of Health and Education—since the Department of Health knows the health needs, and has the authority to control them; moreover it also has ready access to new or changing scientific health knowledge; on the other hand, the Department of Education has the means and authority for reaching the most impressionable minds in a community. For this reason, these departments cannot work too closely in organizing and promoting the programme of health teaching in the school. Co-operation and understanding of the aims and work help each to perceive the other's point of view. This can be fostered through the directors of health education, who have not only a thorough knowledge of school health educational problems, but are health workers in close contact with public health workers and teachers in the field.

In communities the Parent-Teacher Associations, Women's Institutes, and United Farm Women, have no small share (indirect though it may be) in the work of teaching health by their co-operation in promoting health practices in the home, obtaining improvements in the school and school grounds, establishing hot lunches, and organizing health conferences and clinics. For this reason there should be close co-operation with all interested organizations as a means of linking the school and home health training work.

We all believe and say that health teachers, including parents, need to be living exponents of health both in appearance and conduct. Yet how many of us are hygienists in every sense of the word? How many of us—physicians, dentists, and nurses, as well as teachers, really believe what we teach so thoroughly that it is exemplified in all that we do? For instance, do we of our own accord have an annual physical examination, or do we wait until we are in need of physical repair? What sort of a prod can we provide for ourselves that is proof against the excuse of "lack of time"?

And so in reviewing the field cleared by health workers a decade ago, we find that the process of cultivation has given us experiences both of success and failure, which were evidently necessary to show us the strength and weakness of the whole health programme. These experiences have taught us to test new ideas thoroughly, and to retain the methods that have proved successful until better methods have been evolved; above all they have made us feel that we are still students and must keep in mind the problems of health education in the elementary school that remain to be solved. Thus we may hope in the not too distant future to realize to the fullest extent that there is "Health in Education and Education in Health."

Editorials

THE WIDENING FIELD OF VACCINATION

THE researches of Prof. Edward Hindle, Beit Fellow in Tropical Medicine, on yellow fever in monkeys with special reference to the method of vaccination are of great interest, not only because they promise to offer a relatively simple and effective means of active immunization against yellow fever but also because there is reason to think that the method may be applicable to immunization against other diseases caused by filtrable viruses. Anterior poliomyelitis and measles immediately come to one's mind. Hindle makes use of the principle which gave brilliant results in the hands of Laidlaw and Dunkin in their work on the vaccination of dogs against distemper, namely, a formalinized suspension of certain organs known to contain the virus.

To Adrian Stokes belongs the credit of making the very important discovery that yellow fever can be readily transmitted to Asiatic monkeys. Hence, it has been possible to study the disease in laboratories far distant from its endemic focus. The virus belongs to the generic group of filtrable viruses and is found in the spleen, liver and kidneys of monkeys dying of the disease in amounts such that 1000 to 100,000 minimum fatal doses are contained in a gramme of the organs. It is of passing interest that 0.0001 gm. of infected tissue was usually as effective as 1 to 2 gm. in producing the disease, but when doses of 0.00001 gm. were employed the incubation period was lengthened. In two instances the inoculation of this dose caused no signs of yellow fever, yet the animals were found to have been immunized and subsequent inoculations of very large quantities of virus had no effect. This brings to mind the work of Hitaishi and Okamoto in measles, in 1921. Blood drawn at a time between the appearance of the Koplik spots and the height of the exanthem when injected in doses greater than 0.002 cc. produced measles in susceptible subjects; whereas when less than 0.001 cc. was injected, measles did not result. The possibility of active immunization by this method of subminimal dosage, though not necessarily that of choice, may prove of value. At any rate the analogy between the two diseases is striking. The virus of yellow fever will retain its virulence 18 days, after which time it acted as a vaccine. Virus dried in vacuo and kept absolutely dry preserved its virulence for at least four months. If this dried virus was exposed to moist air it gradually lost its virulence and could then act as a vaccine. The immunity following an attack of the disease has been known for years to be high and lasting. The serum

of convalescents will protect monkeys for a period of a month. There is ample proof that convalescent blood from cases of measles and poliomyelitis is effective, the one known to be efficacious in prophylaxis, the other in treatment and by analogy probably also in prophylaxis. Hindle was able to show in his own case and in that of his assistant that a mild attack, unrecognizable by the symptoms produced, was also able to confer immunity. Within ten days after vaccination with a formalinized suspension of virus monkeys were refractive to 1000 times the dose known to be effective in killing power. It is very gratifying that Hindle's results have been confirmed in Rio de Janeiro, by Aragao, using a Brazilian strain of yellow fever and by A. Pettit of the Institut Pasteur, Paris. This vaccine has already been administered in Brazil to between 300 and 400 individuals without ill effect. The Colonial Office has decided to give the vaccine a trial in West Africa. There is reason to hope and even to expect that yellow fever may cease to exist as a scourge or source of danger in the world. Without undue optimism one is at least encouraged to look forward to the discovery of a practical method of vaccination against measles and against anterior poliomyelitis in the not too distant future.

A VITAL STATISTICS SECTION

THE need has been felt for some years for the formation of a section of vital statistics in the Association. Through the energetic leadership of the Dominion Bureau of Statistics the collection of vital statistics in the various provinces has been unified and Canada to-day has an approved registration area embracing every province. The Annual Report of the Bureau presents in one volume the vital statistics of all the provinces together with tabulation and analyses of much of the data. This is an achievement of which Canada can well be proud. But there are many problems which arise that could be discussed with great profit by those who are responsible for the actual collection of the data in the provinces. Further, vital statistics is definitely an international subject. By international agreement changes in the classification of the causes of deaths are made by a conference every ten years. The Section of Vital Statistics of the American Public Health Association has been one of the most important and valuable sections in that assscіation. Its findings are presented to various international bodies and it has served to voice the opinions of the leading vital statisticians of the United States.

But Canada has not had the opportunity of such independent expression. The new section in the Association, it is believed, will be of great value in advancing the interests of Canada in this field. We are indeed most fortunate in having as the first chairman of this section, Mr. R. H. Coats, Dominion Statistician, and the counsel of Mr. E. S. Macphail, of the Dominion Bureau, and Dr. G. G. Melvin, Provincial Medical Officer of Health of New Brunswick.

NUTRITION

LEXA DENNE, B.A. AND E. W. MCHENRY, M.A., PH.D.

CARE OF THE INFANT AND CHILD DURING THE SUMMER MONTHS

FREDERICK F. TISDALL, M.D., TORONTO

THERE are many problems in the care of infants and children peculiar to the summer months. Many questions in connection with food, drinking water, clothing, fresh air, sunshine, bathing and summer resorts are of the utmost importance, and definite information should be given to mothers on these subjects. The following set of instructions has been found most useful.

FOOD

Quality and Quantity.

During hot weather the ability to digest food is diminished. The amount administered to infants and children at this time should be reduced by about one sixth to one quarter the usual amount. With infants the strength of the feeding rather than the actual amount should be reduced on account of the great need of the infant for fluids. For instance, if the baby is receiving eight ounces of whole milk at a feeding the strength should be changed by adding two ounces of water to six ounces of milk. The infant will naturally not gain as well on this reduced diet, but this is of little importance compared to the serious results which might develop from a gastro-intestinal upset due to overfeeding.

Milk. After delivery, milk should be put in the refrigerator as soon as possible. It is most essential during the hot weather that all milk for babies and children under three years of age should be boiled 3 minutes whether previously pasteurized or not. This will destroy any harmful bacteria which may be present.

Ice Cream. The use of ice cream by small children during the hot weather is a very live problem. Ice cream may be very dangerous and many serious gastro-intestinal disturbances in summer have been traced to its use. If ice cream is to be given at all to children under five years of age it should be made at home and composed largely of milk. It should be considered a special treat and given as a dessert not more frequently than once or twice a week. Ice cream should not be eaten between meals.

Fruits. The only whole raw fruit which should be given to children under three years of age is well ripened banana. Orange juice, of course, may be given at any time. After three years of age cut up oranges, peeled apples and peaches may be given with caution, but not every child can digest all of them until five years or more of age. Raw pears, strawberries, raspberries, blue-berries, cherries, etc., should not be given until five years of age. In regard to cooked

fruits, prune pulp and apple sauce may be given at one year of age, cooked peaches at two years of age, cooked pears at three years of age and cooked small fruits at four years of age.

DIARRHOEA AND VOMITING

At the first signs of diarrhoea or vomiting two or three feedings should be omitted and plenty of plain boiled water given. Milk diluted one half to two thirds with water may then be used and the strength gradually increased until the previous formula is again given. With older infants and children it is advisable to stop all food for 24 hours and give nothing but orange juice and water. An enema of one pint to one quart of soapy water is of value.

DRINKING WATER

The water or fluid requirements of infants are simply tremendous. This is particularly so during hot weather. If the average adult were to drink the same amount of fluids as the infant in proportion to his weight the amount consumed would be 25 pints every day. During hot weather every infant should be offered plain boiled water between each feeding, if awake. If the baby refuses the water it is quite all right, but at least give him the chance to refuse. The best time to offer water to infants is one half to one hour before feedings. The water should be boiled during the first year of life and for a longer period than this if there is the slightest question as to the purity of the supply.

CLOTHING

Infants are almost invariably dressed too warmly. As a result the skin becomes moist to the touch and a small drop in temperature chills the body and makes the baby susceptible to cold and other infections. A good guide to the amount of clothing necessary is the moisture of the skin. If it feels moist to the touch the baby is dressed too warmly. If the feet and hands are cold and the lips blue more clothing is required. On the hot summer days all the clothing that is necessary is a diaper and a light cotton shirt or sleeveless band and on very hot days even the shirt or band may be removed. On hot nights only a light knitted cotton nightgown and diaper are required but care must be taken when the temperature drops through the night that a cover be put over the baby.

The same general rules apply to the summer clothing for children. On very hot days nothing is better than the sun suits which can now be procured at most stores carrying children's clothing. The tendency is always to dress the child too warmly. Remember, too much clothing is one of the frequent causes of colds.

FRESH AIR AND SUNSHINE

It is hardly necessary to emphasize the value of fresh air and sunshine. On very hot days and nights a circulation of fresh air either produced naturally or with the assistance of a small fan will help greatly in keeping the infant or child cool. The fan should not be turned directly on the child, but used to keep the air in circulation.

The direct rays of the sun are most valuable from the health standpoint. However, during hot weather it is inadvisable to expose infants to the sun's rays at the middle of the day. The best time is between 8 and 10 in the morning before the sunshine is too hot. On the extremely hot days the sun bath should be omitted and the baby exposed outside to the rays from the sky but protected from the direct rays of the sun. Starting with infants at three to four weeks of age a five minute exposure of the face, arms and legs is sufficient. The time of exposure should be increased 2 minutes a day until the infant is receiving one half to one hour exposure daily. Older infants and children should be provided with sun suits and allowed to play in the direct rays of the sun.

BATHING

During very hot days small infants may be kept cool by giving two or three spongings of a lukewarm solution of one teaspoonful of baking soda to a pint of water. After drying the baby should be powdered liberally with ordinary corn starch.

The bathing of older infants and children in the sea or in fresh water should be carefully supervised as much harm may be done by indiscriminately allowing them to go into the water whenever they please. Young children may play on the beach and paddle in the water provided it is not extremely cold. Children under five years of age, however, should not be allowed to become actually immersed unless the water is quite warm (over 70°F.). Under ten years of age a child should never go in the water more than once a day. A child should never be allowed to stay in the water until he becomes cold and his lips blue. The length of time a child can stay immersed in the water without harm varies with each child, but as a general rule five minutes is quite sufficient.

SUMMER RESORTS

Large summer hotels are not the best places to take children for the summer. It is practically impossible to supervise the kind of food obtained or its preparation. It is much more desirable from the children's standpoint to have a summer cottage or go to a boarding house or small hotel. In many cases clean fresh milk is not available. This is not an unsurmountable difficulty as whole powdered milk or evaporated milk may be used. The addition of suitable amounts of water will result in a milk of the same strength as fresh milk and it will be found just as serviceable and much safer than milk from an unknown source. If local milk is obtained it should, if possible, be from a herd of cows rather than from one cow, as in this way the composition of the milk is more consistent. Jersey milk should not be used as it is frequently too rich. If there is any question as to the water supply the water as well as the milk should be boiled.

SUMMARY

(1) During the hot weather the amount of food given infants and children should be reduced by one sixth to one quarter the usual amount.

(2) All milk for children under three years of age should be boiled.
(3) The use of ice cream may result in serious gastro-intestinal disturbances.
(4) The directions for the use of fruits have been given.
(5) Every infant during the hot weather should be offered plain boiled water between each feeding if awake.
(6) Infants and small children are almost invariably dressed too warmly. The directions as to what clothes are necessary have been given.
(7) The bathing of children in the lake or sea should be carefully supervised. Under ten years of age a child should never go in the water more than once a day. A five minute stay in the water is quite long enough.
(8) A summer cottage is the most suitable place as a summer resort for children. If the local milk supply is not dependable dried or evaporated milk may be used.

PUBLIC HEALTH NURSING

RUBY M. SIMPSON, REG.N., AND FLORENCE H. M. EMORY, REG.N.

THE RED CROSS CAR; A FACTOR IN COMMUNITY SERVICE

GLADYS REED, REG.N.

THE words Red Cross Car may be a little misleading unless one knows the type of car and its many uses in a community. This Car is an old Canadian National Railway coach loaned by that company. It has been somewhat transformed and is now quite a unique hospital on the rails. The hospital car is equipped for emergency and disaster work in the Province of Ontario. The Ontario Division of the Red Cross furnished the Car, and the cost of maintenance is borne by them with the assistance of the Port Arthur Branch. When the Car is not needed as a disaster unit, the service carried on from it is a very interesting piece of public health work.

The Car was first used at Hudson at the time of the gold rush to Red Lake. Later it was sent to Thunder Bay District and was used as a clinic centre in a Finnish settlement. In March, 1928, after some improvements had been made, the hospital car was brought to Kakabeka Falls, where a survey was made and the needs of the community found. Kakabeka Falls is about twenty miles from Fort William where the nearest doctors reside and during the winter it is quite isolated. The population of the village is small but there is quite a large territory surrounding it; in fact, at this point four townships meet. After several months of public health nursing work in the district, the community decided they would like this to be a permanent service. A local branch of the Red Cross was formed and a campaign for membership throughout the four townships carried on. A donation of a piece of land

was given on which to build the outpost. The community drew up their own plans and decided to have two rooms for patients. At present there is about fifteen hundred dollars in the treasury and the amount is steadily increasing. During the winter there have been a number of entertainments in the form of whist drives, dances and concerts. Some of the children caught the spirit and a small boy raffled his pet rooster, and a girl her pet canary. Another group of Red Cross Juniors raffled a cushion and sent the proceeds to the Outpost.

The type of work carried on by the nurse is of a varied nature. She does bed-side nursing in the homes throughout the district and in the hospital car under a doctor's orders. She is called upon for advice, first aid, and minor dressings. A generalized public health programme is carried on: dental clinics are held periodically in the Car; arrangements are made for tonsil and eye clinics. Home nursing classes for the juniors and seniors are taught by the nurse; she assists in solving the problems of some of the many social cases; interprets to the patient the treatment outlined by the doctor; makes arrangements for patients to go to hospital and for their care when they return. The people of the community soon become very dependent upon the nurse; even the children when they are hurt run to the Car to have their injuries cared for.

A community wishing to have the hospital car, must make a request to the Ontario Division of the Red Cross. It has been felt that a better piece of work can be accomplished if the community seek their assistance. If the community wish this to become a permanent service, the nurse assists in organizing a local branch. Then the community build, buy or rent a building suitable for this purpose. They also equip the building and the Ontario Red Cross maintain the Outpost, including salaries and the cost of food and fuel. Charges are made for the care of patients in the Outpost and also for bed-side nursing in the homes and minor treatments and dressings. These fees and the small Government grant help to offset the cost of the upkeep.

The hospital car is divided into three rooms; the hospital, containing two beds for patients, bed-side tables, chairs and a large dressing-table. This room is used for clinics, demonstrations and as a class-room where home nursing classes are taught. The room is painted in white with brown linoleum on the floor. At one side of the entrance is a washroom with a sanitary toilet. The washroom serves as a utility room containing bed pans, basins, hot water bottles, ice caps, enema and interstitial outfits. The centre room is the living room and kitchen combined. To the right of the door are two cupboards; one a linen closet and the other a drug and supply cupboard. There are supplies ready for an emergency. The nurse's desk is in one corner with a shelf below containing records. A cupboard and a refrigerator, two caboose stoves and a water tank are some of the necessities. The third room is the bedroom for the nurse and housekeeper. This arrangement is not the most satisfactory, but in close quarters

it is impossible to have separate rooms. To the right of the entrance is a washroom and clothes closet combined and on the left is a coal bin and a supply cupboard above. In this cupboard a large supply of extra dressings, plaster bandages, swabs, sputum bottles, slides and water bottles are kept ready for emergency. A supply of antitoxins, sera and vaccines are kept on hand. A pressure cooker is used for sterilizing dressings, gowns, and an old fashioned fish boiler for sterilizing instruments.

The Port Arthur Branch of the Red Cross have given the nurse their sincere support and interest in her work. They have also assisted materially in the general upkeep of the hospital car. The voluntary worker in the field of public health is indeed an asset to our work.

INDUSTRIAL HYGIENE

F. G. PEDLEY, B.A., M.B., D.P.H.; J. G. CUNNINGHAM, B.A., M.B., D.P.H.

EFFICIENCIES OF PAINTERS' RESPIRATORS FILTERING LEAD PAINT, BENZOL AND VITREOUS ENAMEL SPRAYS.

The principal hazards to which operators of spray guns are exposed are lead, benzol, and silica particles in enamelling. The authors of this monograph have gone into the question of the protection of spray-gun operators with masks.

The problem was set by the National Safety Council as follows:

1. What filtering material, if any, is adequate—

(a) To reduce the lead content of the air to which a spray coater is exposed from 200 milligrams per cubic meter to 0.6 milligram per cubic meter?

(b) To reduce the amount of benzol under similar conditions from 2,000 to 75 parts per million?

(c) To reduce the number of silica particles under similar conditions from 200,000,000 to 100,000 per cubic meter as determined by the Palmer method?

2. How long would a layer of such material function?

3. How do certain typical masks now available measure up to this standard?

A number of filtering materials were tried such as cheese-cloth, muslin, canton flannel, cotton felt, filter paper, and absorbent cotton. These materials were tested out both in masks and by themselves in a special holder. Various masks were tried such as the pig-snout variety, cone, army type and the type with an auxiliary air supply from the pressure line.

The test material for the lead and benzol was a paint made up of white lead, linseed oil and benzol. That for the silica was an aqueous suspension of finely divided silica. In testing for lead the dust which passed through the filter was caught by a Cottrell tube and analysed in the ordinary way. The benzol was determined by an inter-

*Katz, S. H., Meiter, E. G., and Gibson, F. H. Public Health Bull. No. 177, United States Public Health Service, Govt. Printing Office, Washington, D.C.

ferometer calibrated against synthetic mixtures of benzol vapour and air. The silica dust was caught in a Palmer apparatus (determined as 79 per cent effective) and counted in a Sedgewick-Rafter counting chamber.

In considering the results of the tests of these various masks and filter mediums it must be remembered that the tests set were very rigorous. When it is considered that 0.5 milligram per cubic meter of lead is laid down by Legge as the upper limit of safety, the 200 milligrams of the test must be an unusually high concentration. The 2,000 parts per million of benzol is also very high and probably not met with often. All the tests called for masks of 95 per cent efficiency or over and, as might be expected, practically none fulfilled the specifications.

In answer to question 1 (a): Several filter materials were found to be quite efficient, but only one (3 plies of high-grade chemical paper) equalled the specification. Of the other filter mediums 12 to 16 plies of muslin, 3 to 4 plies of absorbent cotton and 2 to 3 plies of filter paper tested over 99 per cent efficient.

In answer to question 1 (b): Activated charcoal filters were found efficient, depending upon the amount of charcoal used. 600 cubic centimeters in a canister were efficient for a period of 250 minutes.

In answer to question 3: Filters for paint mist will function indefinitely, but cannot be used when their resistance becomes more than 4 inches of water. Only one ply of filter paper could be tolerated in a respirator; its resistance is about the same as 16 plies of muslin (2.2 inches of water). When fresh, both of these mediums could be used in a respirator by paint sprayers for an hour or so.

Only the army type gas mask and a respirator with an attached cartridge of charcoal and tissue paper filters were found to fulfil the requirement of question 3 with respect to lead and benzol. All the other respirators were inactive against benzol. In filtering lead the common pig-snout respirator with a sponge filter was found to be 84 per cent efficient, a similar type with one ply of cotton paper instead of the sponge was 97 per cent efficient. In connection with the silica dust the so-called Fogler flat-felt filter proved to be about the best. It consists of an army-type face mask connected with a filter of woollen felt which is held to the chest by shoulder straps. The woollen felt has an area of about 75 square inches and so provides very little resistance to breathing.

These results may be considered applicable to plant conditions provided the respirators fit the men. Badly fitting respirators will naturally not give as good results.

CHRONIC CARBON MONOXIDE POISONING:

Battley, J. C. S., Canad. Med. Assoc. Journ., 19, 157, (*August* 1928).

The author is apparently anxious to awaken the medical profession from its *laissez faire* lethargy with respect to automobile exhaust gases, fuel gases and other sources of carbon monoxide, which contaminate the air of our streets and houses. Cases of acute poisoning by this gas are of common occurrence, but cases of chronic poisoning are not commonly

recognized. We take it that the author's conception of chronic carbon monoxide poisoning is that of an insidious, cumulative action due to the exposure of an individual over a considerable period of time to concentrations of gas insufficient to produce acute symptoms. He quotes a number of authorities, but with the exception of two, McGurn and Egdahl, the authors referred to appear to speak of the residual results of acute poisoning and not to chronic poisoning as we understand it. The symptoms, according to McGurn, are mostly referable to the nervous system such as peripheral neuritis, permanent muscular weakness, petit mal, chronic invalidism and the like. Hypertension and glycosuria are also mentioned. Many of the individuals had been exposed to concentrations of carbon monoxide gas so small that they had quite failed to realize the danger they were in. No evidence, however, is produced that the conditions described were really due to small amounts of carbon monoxide. Indeed it would be difficult to establish a proof in such cases, for it would be nearly hopeless to expect to detect the gas in the tissues with the apparatus at present at our disposal. From Battley's paper we appear to be dealing with impressions rather than facts. There is a popular impression that individuals exposed to small concentrations of carbon monoxide over periods of months (such as traffic policemen and garage workers) do exhibit symptoms of asthenia. But convincing evidence that this asthenia is due to carbon monoxide and not to some associated condition remains to be proved.

EPIDEMIOLOGY AND VITAL STATISTICS

F. W. JACKSON, M.D., D.P.H., AND NEIL E. MCKINNON, M.B.

TOXOID IMMUNIZATION IN BURNABY, B.C.

DIPHTHERIA throughout Canada is one of the chief causes of death in children. In the five years 1922-1926, in Ontario, it was, in the age group 1-4 inclusive, the fourth cause of death and in the age group 5-14 it ranked as the second cause. In the age group of 2-14 it is commonly the second cause of death, the first being the group under the heading of external causes. In the past two years this country has noted diphtheria of a very toxic and extremely severe type. The same type was reported in the United States and in Europe. In these cases the progress of the disease is very rapid and the death rate among such cases is very high. The occurrence of this virulent type makes more imperative the necessity for active immunization. And because of the fact that the pre-school age group supplies approximately 50 per cent of the diphtheria deaths, it is necessary that immunization should be given to the pre-school child. The account of toxoid immunization in

Burnaby, B.C., supplied by Dr. McCammon shows what may be accomplished even with opposition.

"For several years past Burnaby has suffered from outbreaks of diphtheria. There have been annually from two to six deaths amongst the school children, besides numerous cases with recovery. This condition has also entailed a great loss of school time for the other children, due to fumigation, etc.

Most of these cases have been in the two schools contiguous to Greater Vancouver. During the school year 1926-27 there was an outbreak in Inman Ave. school (five class rooms) with two deaths and several recoveries. There had been yearly outbreaks in this small school with several deaths in previous years. During this last epidemic swabs were taken of all children in this school, four carriers were discovered and at once put under treatment. In the spring of 1928 in Gilmore Ave. school (19 classes) there was an outbreak with four deaths and twenty recoveries. Isolated cases appeared in the Gilmore district during the summer.

In conjunction with Dr. McIntosh, the Medical Health Officer, a campaign for toxoid inoculation was started in the fall of 1928. Notices were sent to the parents of all the children in the schools, offering treatment free of charge. Particular notice of this was made in the two previously mentioned districts, and as a result a large number of the inoculations were done in these schools.

The toxoid used for this work is supplied in cartons for ten people complete. Each carton contains an ampoule for reaction test, which is advised to be given previous to immunization. Our municipality is a widely scattered one, with twenty schools, miles apart. Consequently it was impracticable to give this reaction test and follow it up properly, therefore it was dispensed with entirely.

A total number of 858 requested immunization. Of this number 798 completed the treatment; 750 children and 48 adults. Of the 858 given the first inoculation, only five children and four adults were advised against completion of treatment, due to the severe reaction. From this I would judge the reaction test might well be dispensed with, where a large number are being done.

With a total school population of nearly 5,000, the number treated may appear small, but during this winter only two cases of diphtheria have been reported, and in widely separated districts, with no further cases appearing in these districts.

We have had to contend with a large section of "Antis" in our population, and also with a widely read Vancouver daily paper which is continually publishing editorials against these treatments. However, a good start has been made, we are getting results, and we will continue this work until diphtheria is eliminated from the municipality.

An interesting note might be added re the "Antis". One of our two cases of diphtheria came from a four roomed school in which only eleven children were immunized. This case was reported on a Saturday, and on the Monday following, when the principal arrived at the school, there was a line

of nearly fifty parents, wishing their children to be immunized. Throughout the district, after refusing to have their children done in the first place, numerous parents, on finding out that the reaction in a large percentage of cases has been negligible, have requested immunization for their children.

In conclusion, I would state that we consider this beginning has borne good fruit, and the work will be continued with less opposition from the parents when they see results. There is now a safe and easy treatment to prevent diphtheria, and no excuse for this most treacherous of all children's diseases continuing to take its annual toll.

J. G. McCammon,
Medical Inspector of Schools,
Municipality of Burnaby."

REPORTED CASES OF CERTAIN COMMUNICABLE DISEASES IN CANADA* BY PROVINCES—MAY, 1929

Disease	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia
Diphtheria....	16	11	180	129	47	34	49	56
Scarlet Fever..	101	42	495	378	79	106	144	49
Measles.....	63	45	661	1889	630	379	369	1470
Whooping Cough.....	12	—	177	432	129	33	17	20
German Measles.....	—	—	91	33	†	6	14	19
Mumps.....	7	—	219	526	237	41	79	662
Smallpox.....	—	—	17	86	6	33	4	29
Cerebrospinal Meningitis..	5	—	14	10	—	—	3	4
Anterior Poliomyelitis	—	—	1	—	—	—	2	3
Typhoid Fever	3	8	57	35	2	3	5	1

*Data furnished by the Dominion Bureau of Statistics, Ottawa.
†Not reportable.

NEWS OF THE ASSOCIATION

THE EIGHTEENTH ANNUAL MEETING

The Eighteenth Annual Meeting of the Canadian Public Health Association which concluded its sessions on the 21st of June was one of the best meetings which the Association has had the privilege of holding. During the same week Montreal welcomed members of the Canadian Medical Association, and of the Canadian Social Hygiene Council. The success of the meeting lay very largely in the excellent arrangements which had been made by the members of the local committee. Nine sessions were devoted to public health and preventive medicine and more than forty papers were presented by the members of the different associations. Interest in public health was not confined to the public health sessions, but at many of the section meetings of the Canadian Medical Association, papers dealing with preventive medicine were presented.

On Monday evening an executive council meeting was held which was

attended by representatives from the various provinces. Plans were discussed for the development of the work of the Association during the coming year and reports were received from the various committees.

The first general session was held on Tuesday morning with an excellent attendance in spite of the extremely warm weather. Mr. R. H. Murray, C.E., Regina, gave a comprehensive report of the Committee on Milk Control in Urban Municipalities. The importance of the work of this committee was fully realized and, at the wish of the meeting, Mr. Murray and the members of his committee were asked to continue their work during the coming year. The report of the Committee on Training of Sanitary Inspectors was presented by Dr. Phair in the absence of the chairman, Dr. A. J. Douglas of Winnipeg. This report was carefully considered and formed the subject of one of the resolutions presented at the annual business meeting.

A luncheon was tendered to the members of the Association by the Provincial government of Quebec at noon on Tuesday, when Dr. Alphonse Lessard officially welcomed the Association on behalf of the Hon. Mr. David. The addresses given by Dr. Lessard, the Hon. Dr. Forbes Godfrey, and the President, Dr. Norman MacL. Harris, were greatly appreciated.

At the afternoon session, Dr. James A. Doull, School of Hygiene and Public Health, Johns Hopkins University, and Director of the John J. Abel Fund for Research on the Common Cold, presented a survey of the recent progress in the study of acute respiratory diseases. Dr. Doull's address was an outstanding contribution to the programme of the Association's meetings. The Presidential address of Dr. Norman MacL. Harris, Chief of the Laboratory of Hygiene, Ottawa, will be read with great interest and profit by all our members. At the same session, Dr. Emile Nadeau, Assistant Director of the Provincial Bureau of Health, Quebec, reviewed the development of public health in the Province of Quebec in a most delightful and interesting manner.

At the remaining sessions of the Association, on Wednesday and Thursday mornings and Thursday afternoon, papers of great interest were presented which will appear in our Journal during the coming months. The Laboratory Section was particularly well attended and great credit is due to Dr. G. B. Reed of Queen's University, Kingston, who arranged the programme.

One of the developments of special importance was the formation of the Section of Vital Statistics in the Association. The need for such a section has been felt for some years, but it is now possible to take this forward step.

On Thursday evening a dinner meeting of the Section of Industrial Hygiene was held in conjunction with the Association of Industrial Physicians of Quebec. At the business meeting there were presented and carefully considered certain resolutions dealing with such subjects as examination before marriage, training of sanitary inspectors, closer co-operation of the provincially organized health associations and the need for training of laboratory technicians. At-

tention was drawn also in a resolution to the shortage of trained laboratory directors, particularly of physicians so qualified, owing to the unsatisfactory standard of salaries paid to such officers.

Resolutions of appreciation of the generosity and kindness of the Provincial Government of Quebec and of the courtesy extended to the Association by the City of Montreal and the Canadian Medical Association were also presented.

Three important committees of the Association will continue their studies and will report at the next meeting. The Committee on Rural School Sanitation will extend its survey under the chairmanship of Dr. Wm. Warwick of St. John, N.B. The Committee on Measures for Active Immunization will likewise continue its work under Dr. D. T. Fraser, University of Toronto. Dr. Fred Adams, Windsor, and Mr. R. H. Murray, C.E., Regina, were re-appointed as chairmen of the Committees on Quarantine Regulations and Control of Milk Supplies in Urban Municipalities.

The Hon. Dr. Forbes Godfrey, Minister of Health of the Province of Ontario, was unanimously chosen as Honorary President of the Association. It was a very great pleasure also to the nominating committee to name Dr. A. J. Douglas, Medical Officer of Health, Winnipeg, as President-elect. Dr. Douglas has been a warm supporter of the Association, and under his leadership the Association can look forward to the year 1930 with great confidence. Dr. William Warwick of St. John, Dr. Alphonse Lessard of Quebec, and Dr. M. R. Bow, of Edmonton, were elected vice-presidents. Appreciation of the great service rendered by Dr. J. T. Phair as secretary of the Association was expressed by representatives from the East and West, and at the urgent request of the executive council, Dr. Phair consented to act again for the coming year. Dr. Gordon Jackson, Medical Officer of Health, Toronto, was re-elected treasurer of the Association.

THE TENTH ANNUAL CONFERENCE

OF THE

ONTARIO HEALTH OFFICERS' ASSOCIATION

The Annual Conference of the Ontario Health Officers' Association was held this year in the Speaker's Reception Room, Parliament Buildings, Toronto.

The 1929 executive, headed by Dr. W. E. George, North Bay, as President, has every reason to be gratified with the success of the meeting, as shown in the attendance—35 per cent increase over that of the previous year—and the whole-hearted interest of the delegates which was maintained from the first session to the last and evidenced by the quality and freedom of the discussions.

Among the items of business were the following resolutions:

(1) BE IT RESOLVED that the Ontario Health Officers' Association go on record as being convinced of the seriousness and communicability of septic sore throat, and recommend that this disease be classed with the reportable and placardable communicable diseases.

of Health for the Province, that legislation be enacted empowering a local board of health to expend a definite mill rate on the assessment of the municipality, such legislation not to curtail the present powers of the local board of health in the event of emergencies or epidemics.

FURTHERMORE, BE IT RESOLVED that a committee be named

President-elect—Ontario Health Officers' Association.
DR. W. L. HUTTON, M.O.H., Brantford

(2) Realizing that protection and promotion of public health has an importance to the community at least equal to that of public school education,

BE IT RESOLVED that the Ontario Health Officers' Association here assembled, respectfully recommend to the Honourable the Minister

by the President to wait on the Minister in regard to this proposed legislation and that a copy of this resolution be forwarded to the Prime Minister of Ontario and the Minister of Health.

In compliance with the terms of the above resolution which was carried unanimously, the following committee was appointed:—

Dr. James Roberts, Medical Officer of Health, Hamilton; Dr. T. W. G. McKay, Medical Officer of Health, Oshawa; Dr. Fred Adams, Medical Officer of Health, Essex Border; Dr. T. A. Lomer, Medical Officer of Health, Ottawa; Senator Dr. Gustave Lacasse, M.O.H., Tecumseh; Dr. A. E. Ranney, Medical Officer of Health, North Bay.

The election of officers resulted in the following executive:—

President—W. L. Hutton, M.B., M.O.H., Brantford.

1st Vice-President — Senator Gustave Lacasse, M.D., M.O.H., Tecumseh.

2nd Vice-President—J. H. Radford, M.D., M.O.H., Galt.

Secretary—Miss Mary Power.

NEWS AND COMMENTS

P. A. T. SNEATH, M.D., D.P.H.

Appointments in the Arctic

THE Department of the Interior has appointed two additional physicians for duties in connection with the Department's activities in the welfare of the Eskimos in the far north. Dr. R. D. Martin of Barrie, Ontario, and Dr. H. A. Stuart of Sydney, C.B., have volunteered for this service. One of these physicians will be stationed at the mouth of the Copper Mine River in the western area and the other at Pangnirtung in Baffin Land. Dr. Livingstone, who has been on duty in Baffin Land, will be transferred to Chesterfield on the Hudson Bay.

New Brunswick

WORKING plans of the new General Hospital, St. John, were considered at a special meeting of the hospital commissioners and the municipal council on May 27th. The estimated cost of the hospital is one million dollars.

The third round of the Diphtheria Prevention Clinics in the Saint John schools has been concluded, approximately 7,000 children having completed the three inoculations; 1,200 of these were pre-school age children.

This campaign has resulted in requests for similar clinics in other parts of the province and already several thousands have been immunized in the larger centres. The response of parents has been particularly gratifying to the health authorities who propose carrying the campaign into the rural districts as soon as possible.

Dr. H. T. Abramson, Director of the Bureau of Laboratories, Department of Health, has returned from attending the meetings of the American Association of Immunologists and Bacteriologists at Chicago.

Quebec

THE ninth county public health unit was inaugurated a few weeks ago in the counties adjoining L'Assumption and Montcalm. Its personnel received the requisite training in

Beauce, the oldest county unit of the province.

Three of our public health officers have recently completed their courses, Dr. R. Foley and Dr. J. Gregoire at the School of Hygiene and Public Health, Johns Hopkins Hospital, Baltimore, and Dr. J. C. Beaudet at the School of Hygiene, University of Toronto. They are now completing their field work in Nashville, Tennessee, and on August 15th they will return to the Beauce unit for their last month of practical training.

The 10th county public health unit, Chicoutimi, one of the largest and most populous counties of the province, will commence its activities about August 1st.

The 3rd annual dinner of the St. John County Unit was held on May 29th. Physicians, parish priests and mayors were present, and the annual report of the unit was presented.

On the 30th of May the 2nd annual dinner of the St. Hyacinthe County Unit took place.

Ontario

MISS E. K. RUSSELL, B.A., Director of Public Health Nursing in the University of Toronto, received the degree of Bachelor of Paedogogy at the recent Convocation at the University of Toronto.

Miss B. A. Ross, Supervisor of School Nurses with the Toronto Department of Health, has been granted a year's leave of absence for the purpose of studying health education at the Teachers' College, Columbia University.

Dr. C. J. O. Hastings has resigned from the Department of Health, Toronto. He has been Medical Officer of Health for some nineteen years and is largely responsible for this very efficient department of continent-wide repute. He will continue to assist in the further development of his work in Toronto in a consultative capacity. Dr. G. P. Jackson, Deputy Medical Officer of Health has been promoted to fill the vacancy left by Dr. Hasting's retirement, and Dr. L. A. Pequegnat, medical officer of Moore Park district in Toronto, becomes the Deputy Medical Officer of Health.

The following candidates completed the examinations at the University of Toronto for the Diploma of Public Health:—Dr. J. C. Beaudet, Deschaillons, Que.; Dr. R. P. Hardman, Toronto, Ontario; Dr. F. W. Jackson, Wawanesa, Manitoba; Dr. R. B. Jenkins, Edmonton, Alta.; Dr. F. S. Leeder, Battleford, Sask.; Dr. J. W. McIntosh, New Westminster, B.C.; Dr. R. B. McClure, Kongmoon, China; Dr. Eva Mader, Halifax, N.S.; and Dr. G. L. Sparks, Port Arthur, Ontario.

The necessary arrangements for the establishment of Old Age Pensions in Ontario have been completed. The Honourable Peter Heenan, Minister of Labour in the Dominion Government, came to Toronto by air on June 11th, and placed his signature to the agreement with that of the Honourable G. Howard Ferguson, Prime

Minister of Ontario. British Columbia, Saskatchewan, Manitoba, Ontario and the Yukon Territory are now contributors to this undertaking with the Dominion Government.

Manitoba

DR. F. W. JACKSON has recently returned from taking a course in public health at the University of Toronto. He has been appointed Provincial Epidemiologist and Director of the Communicable Disease Division of the Department of Health and Public Welfare, Government of Manitoba.

We welcome Dr. Jackson to the fold of full-time health workers.

Dr. M. S. Fraser, former Provincial Epidemiologist, has been appointed Chief Health Inspector of hospitals, maternity homes, baby boarding homes, and public institutions receiving government aid or private institutions licensed by the government.

Saskatchewan

THIS province now has its full-time health district comprising some eight municipalities, the village of Meysonne, LaFleche, Limerick, Woodrow, Kincard, Hazenmore, Bateman, Hodgeville, St. Boswells, Palmer, Shamrock, Eltington, Vantage, Vanguard and the town of Gravelbourg. It is estimated that this unit will require $14,000 for its maintenance during the first year, one half of which will be borne by the municipalities concerned and the other half by the Provincial Government. One half of the Government's share is being provided by the Rockefeller Foundation. Dr. Antonio Gregoire, a graduate of Laval University, is the medical officer in charge. He is assisted by Miss Kate Nickie, Reg.N., and Mr. E. Hockley, sanitary inspector, as well as Miss M. A. Pacquette, as office assistant and laboratory technician.

British Columbia

PLANS for a survey of nursing in Canada, which have been in the hands of a joint committee of the Canadian Medical and Canadian Nurses' Associations, have culminated in the appointment of Dr. George M. Weir, Head of the Department of Education of the University of British Columbia, to make the survey. Dr. Weir is well known as an outstanding educationalist, and he has also won high commendation through the exhaustive survey of the educational system of British Columbia which he conducted in 1925. The proposed survey of nursing is the outcome of suggestions from many sources, and of much discussion by both medical and nursing organizations, which resulted finally in the appointment of a joint committee of the Canadian Medical and Canadian Nurses' Associations under the convenorship of Dr. Stewart Cameron of Peterborough, Ontario. Dr. Weir has been granted leave of absence from the University, and will make his headquarters for the survey in Toronto, where, during the next few months, plans will be formulated, under his direction, for a most thorough investigation of all phases of nursing in Canada.

BOOK REVIEWS

D. T. FRASER, B.A., M.B., D.P.H. and R. R. MCCLENAHAN, B.A., M.B., D.P.H.

Manual of Aseptic Technique — *Revised edition,* 1927. *Issued by the Providence City Hospital (a hospital for contagious diseases).*

The main emphasis of this pamphlet is found in the words of the opening paragraph, and we find the same words repeated to form a foreword at the beginning of the text. They read as follows: "Employees are held responsible for the complete and conscientious observance of the technique described in this manual. This requirement is necessary not only to prevent the spread of infection from patient to patient, but to insure employees against contracting infection from patients." Starting thus the pamphlet proceeds to outline, in a simple but very exact form, the total procedure for dealing with infection from the moment the ambulance driver receives his call to bring in a patient until the nurse leaves the patient in the discharge room. The comings and goings of all employees to the wards, doctors, nurses, porters, cleaners, maids, laundrymen, etc., all are provided for, and a technique that is simple and consistent is planned for all.

The arrangement of the text might be improved. Doubtless there is a plan in the method of presentation suited to the hospital needs, but it is hard to follow it. For example, one chapter or division (the third in order) is called "Ward Technique" and is just two pages in length, whereas the next division is entitled "Significance of Different Cards", but is really found to contain many pages of directions, much of which involves ward technique, and very little of which has to do with "cards". Except for this matter of arrangement, the pamphlet provides a very serviceable manual.

The attitude of insisting that all employees must share the hospital's responsibility in the prevention of spread of communicable diseases, and also the placing of the burden of the prevention of infection among nurses themselves upon their own shoulders, should receive high commendation and wide acceptance. Obviously the hazard of contracting communicable diseases cannot be entirely eliminated because of accidents beyond one's control which may occur during the performance of nursing duty. However, if the hospital enforces the carrying out of methods of immunization among their employees for those communicable diseases against which there can be afforded satisfactory protection, and if also the principles outlined in this pamphlet are adhered to, there is no doubt that a great advance in hospital management will be effected.

E. K. Russel.

CURRENT HEALTH LITERATURE

D. T. Fraser, B.A., M.B., D.P.H.

Recherches sur L'epidemiologie de la Poliomyelite.—*C. Kling, Office Internat. d'Hyg. Publique,* 1928, *Bull. Tome XX,* 1928, *fac. No.* 11.

An Investigation into old and recent epidemics of poliomyelitis was undertaken by Dr. Kling, of Stockholm, for the League of Nations, Section of Hygiene. For that reason and for the fact that Kling is a recognized authority, his deductions command attention. The study covers epidemics in Sweden (1905 and 1913), Saxony and Roumania (1927). The report is too long to review in detail. However, some of the salient features will be outlined. The fact that there is an immunity to poliomyelitis has been established both by clinical and by laboratory observation. This immunity appears not only in those who have recovered from a typical attack, but also in those in whom the disease has been atypical or abortive and is even demonstrable in those living in an infected area who have never shown any recognizable symptoms. Abortive cases may comprise from 15 per cent (Wickman) to fifty per cent (Kling and Levaditi) of all cases. One must suppose that unrecognized cases exist in endemic zones. The first symptoms are commonly referable to the digestive system—vomiting, diarrhoea or constipation. Kling is of the opinion that the incubation period is approximately 17 to 18 days. It is noteworthy that familial infections, according to the literature, vary between 4 per cent. (N.Y.) and 18 per cent. (Sweden). The peak of infections is usually in September. Clinically, there is every reason to believe that the virus ordinarily enters the body by way of the intestinal tract. Experimentally, the virus has been demonstrated to be present in the nose and throat secretions in 5.4 per cent of the cases and in 11.8 per cent in the intestinal tract. Data of an exact nature on the presence of the virus in healthy carriers are very meagre. A satisfactory explanation of the enigmatical appearance of the disease is furnished, according to Kling, by the epidemiological data, that the disease is spread by water. A case for the acceptance of this hypothesis is made and based upon his investigations in Sweden, Saxony and Roumania. In other words, poliomyelitis belongs to the category of water-borne diseases. When epidemic foci exist, these foci are found in the neighborhood of water systems and in sharp contrast to their absence on railway routes. He goes so far as to generalize—no water, no foci of infection of poliomyelitis. In support of these contentions, he cites the experimental fact that the virus is found in the intestine and eliminated from the intestine; that the virus may long retain its infectivity in water and in milk; that the virus may be present in filtered water; the fact of familial infections; the creation of a mass immunity (suggesting a common vehicle, such as water). Kling further suggests the possibility that spread by contact is not so important as has been assumed heretofore.